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COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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Amdahl 'Assist' Package Makes MVS/SE Work on 470

By Don Leavitt
CW Staff

SUNNYVALE, Calif. — Amdahl Corp. last week introduced a software package that allows the MVS/SE operating system selectable unit (SU) — offered by IBM for its Series 30 processors — to run on Amdahl 470 systems.

Known as MVS/SE Assist, the package is the first program product for which Amdahl will charge its customers. Assist simulates many of the IBM 370 extended hardware instructions by providing software routines that perform functions identical to the machine language/microcode combination utilized by MVS/SE itself, an Amdahl spokesman explained.

Expected to be available in mid-October, Assist will run on any of the Amdahl CPUs as long as they have the operating system, the MVS/SE and other appropriate IBM-provided SUs in place, he said.

Although it appears to be the first attempt to bridge a gap between the two large-scale — and otherwise

(Continued on Page 8)

DP Crime Bill Revision Urged to Accommodate Changes in Technology

By Edith Holmes
CW Washington Bureau

WASHINGTON, D.C. — The computer crime bill now before Congress must be revised if it is to plug loopholes in the laws applied to computer crimes today, witnesses told the Senate Judiciary Committee's Subcommittee on Criminal Law and Procedures here last week.

Senate Bill 1776 — which would make computer-related felonies punishable by fines and jail terms — was introduced last July by Sen. Abraham Ribicoff (D-Conn.) and co-sponsored by Republicans as well as Democrats.

Despite the generally expressed need for such a law, the subcommittee, chaired by Sen. Joseph R. Biden Jr. (D-Del.), was urged to move slowly and cautiously in revising the proposed statute in order to make it less vulnerable to the rapid pace of technological change. In particular, the bill's present definitions of such terms as "computer," "computer system" and "computer network" are largely dependent on current technology and therefore tend to be unduly restrictive.

That advice came from Donn B. Parker, a senior information management consultant at SRI International, and Susan Hubbell Nycum, a member of the San Francisco law firm of

(Continued on Page 4)

U.S. Considering Funding

Global Net May Serve Third World

Special to CW

WASHINGTON, D.C. — Less developed countries (LDC) would have access to U.S. data banks with the costs of the terminal facilities and global communications links underwritten by the U.S. government under network proposals being studied by State Department officials here.

Such a move, however, would probably spark a strong response from the European and communist bloc nations, and opposition to the tentative U.S plans may arise at the Intergovernmental Conference on Strategy and Policies for Informatics (Spin) to be held in Torremolinos, Spain, from Aug. 28 through Sept. 6.

In addition, several LDCs are also likely to oppose the program under consideration, both on privacy grounds and because the program is seen by some as a "new colonialism for the information age."

Political Issue

Furthermore, such a proposal by the U.S. would place information policy and access squarely in the political arena for the first time, European sources indicated, and make it a political football not only between the communist bloc and the West, but also between the developed and less developed nations.

While some sources expect the U.S. to make such a proposal at this summer's Spin meeting, State Department officials admitted last week that they were still "groping" with the idea and that a concrete proposal would not be ready until the United Nations Conference on Science and Technology for Development in Vienna, Austria, in the fall of 1979.

However, they did indicate that there is a "broad-based" effort under way to prepare for such proposals and admitted that LDCs are also involved in the planning for such a network so that it

(Continued on Page 6)

Upkeep Charges Seesaw at IBM

WHITE PLAINS, N.Y. — Some users of IBM 360-age equipment had their Minimum Monthly Maintenance Charges (MMMC) raised last week while users of some 370 equipment got a reduction.

IBM announced both those increases and decreases as it juggled by 10% or less the maintenance prices on equipment that is out of production.

The 360 users got the increases: The MMMC for a 32K-byte 360/30 is now $179, up from $171; a 65K-byte 360/44 went from $332 to $365; a 512K-byte 360/65 rose from $699 to $768; and a 1M-byte 360/95, already high at $20,700, got hit with a $2,070 boost.

Also included in the increases is some peripheral equipment, such as the 2314 disk drive (from $79 to $82.50) and the 3767 Model 1 communications terminal, which increased to $45.50 from $41.50.

For 370-generation equipment, the story was the opposite. For example, the MMMC on a 512K-byte 370/135 was reduced from $971 to $874; a 512K-byte 370/145 went to $1,215, down from $1,350, a 1M-byte 370/155 was reduced to $1,690 from $1,875; and a 1M-byte 370/165 dropped from $3,110 to $2,800.

On the peripherals side, the 3330 Model 1 disk was reduced from $178 to $170 MMMC, the Model 2 went from $105 down to $100 and the 2305 Model 1 disk from $533 to $480.

Downhill All the Way

By Tim Scannell
CW Staff

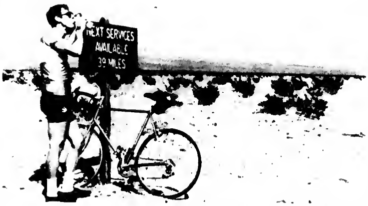
CHINA LAKE, Calif. — Aided by a computer-produced contour map and a pair of touring bicycles, two scientists at the Naval Weapons Center (NWC) here succeeded in traveling from the highest point in the contiguous U.S. to the lowest — in less than one day.

Edmund Schramko, a mathematician with the NWC, and Tom Kratzke, a graduate student in statistics who worked at the center last summer, began their trip last year at the 14,495-foot-high peak of nearby Mt. Whitney. The journey ended 144 miles later at Badwater in Death Valley, 278 feet below sea level.

Although the two men knew the general route they wanted to follow, they utilized a computer and a computer output microfilm (COM) recorder with plotting capability to translate statistical data into visual representations such as maps, charts and graphs. These helped them determine where to establish their "pit stops" or watering sites.

The idea of planning the bicycle trip became an actual part of the research into contour analysis mapping now under way for the military. The mapping technique, known as graphic terrain analysis, involves applying

(Continued on Page 8)



Ed Schramko pauses for refreshment on his one-day journey from the highest point in the U.S. to the lowest. The trip was mapped with the aid of a mainframe, a COM recorder and a specialized graphics software package. A CW Special Report on Computer Output Equipment follows Page 48.

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Law Expected by Summer's End

House Unit OKs $50 EFT Liability

By Marguerite Zientara
CW Staff

WASHINGTON, D.C. — The House Banking Committee has unanimously approved a bill limiting customer liability in banks' electronic funds transfer (EFT) systems to $50, except in cases of fraud or negligence. The Senate Banking Committee approved a similar measure in late April.

At present, there is no federal limit on an individual's liability for unauthorized use of electronic banking facilities, although some states and some banks have set limits.

House Banking Committee Chairman Henry Reuss (D-Wis.) attributed consumers' slowness in accepting EFT to the fact that "there weren't federal laws protecting consumers from losing their life savings through fraud or some foul-up in the electronic systems." Reuss predicted the bill would become law by the end of the summer.

In addition to EFT, the legislation covers such electronic banking services as telephone bill paying, preauthorized bill payments and the direct deposit of salaries into accounts. It applies to commercial banks, mutual savings banks, savings and loan associations and credit unions.

Under the bill, the consumer would not be protected if the loss were part of a fraudulent scheme in which he participated or if he failed to notify the bank "within a reasonable time" after his EFT access card was lost or stolen.

The consumer also would not be protected if he disclosed his personal identifying number (PIN), kept it with the card or wrote it on the card.

The bill would require financial institutions to correct all bank errors within 10 days of notification under most circumstances. It would bar banks from sending unsolicited access cards to individuals unless the card required an individual's written approval in order to work.

Financial institutions would be required to disclose terms and provide transactions receipt.

Further, the bill would make an institution liable for damages to an individual that resulted from the institution's failure to make a requested electronic transaction, such as paying a bill. The institution would not be held to this provision, however, if the transaction did not occur because of "technical malfunction caused by circumstances beyond its control."

Access to Account Data

The bill would assure that information about a customer's electronic transactions could be disclosed only:

- To the account holder.
- To another person who is a party to the transfer of funds when the information is necessary to effect or correct the transfer.
- To communicate the terms and history of a credit transaction as defined in the Truth-In-Lending Act for a consumer reporting agency.
- To a person authorized by law to have access to the records of financial institutions in the course of his duties.
- Pursuant to a court order.
- Pursuant to the express written authorization of the accountholder for a particular purpose.

The bill's chief sponsor, Rep. Frank Annunzio (D.-Ill.), hailed it as "charting new waters." However, some of the bill's most controversial provisions — allowing individuals to reverse a cash transfer — was deleted in committee.

A spokesman for the American Bankers Association (ABA) said that from its point of view, only one minor problem remains with the legislation. The ABA disappoves of a provision stating that no seller may charge more for goods and services paid for by check than by EFT.

"When a financial institution charges less for an EFT transaction, it is simply a case of the financial institution passing on its savings to the consumer," the spokesman said.

Jury Still Debating Fate Of Memorex vs. IBM Case

By Catherine Arnst
CW Staff

SAN FRANCISCO — After two weeks of deliberations, the jury charged with deciding IBM's guilt or innocence in Memorex Corp.'s billion-dollar antitrust lawsuit against the firm still has not reached a verdict.

The six women and five men have been sitting from 9 a.m. to 5:30 p.m. with a 15-minute break each day since June 8 [CW, June 19], and apparently they have spent most of that time going over the 20,000-page transcript accumulated in the five months of trial.

At the start of the deliberations, the jury made a request for a blackboard, which was granted, and a dictionary, which was denied.

Early last week the jury asked its first question, which concerned Judge Samuel Conti's instruction about determining the intent of a firm to monopolize an industry. Intent is at the heart of the second hurdle the jury must cross to reach a decision, according to Conti's instructions, and the question could signify that jury members are halfway to making a decision.

However, the jury foreman did say members of the jury had reached very few agreements so far when Conti asked for a progress report June 19. He added that they are moving "very slowly," implying it would be a minimum of another five days before any verdict could be expected.

Memorex is suing IBM for $306,580,000 on grounds it monopolized the computer industry. If Memorex wins, any damages the jury awards it will be tripled.

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— Kenneth J. Panzarella, Vice President
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Students' Conviction for Theft Held Unlikely

By Brad Schultz
CW Staff

TORONTO — The three former University of Alberta (UA) students who stand accused of "stealing" telecommunications services for allegedly setting up unauthorized computer accounts on a university computer system will probably not be convicted, according to Canadian computer law expert Daniel Cooper.

Section 287 of the Canadian federal criminal code, under which they have been charged, is addressed to the "theft of telecommunications services" and has never before been used to prosecute cases of alleged computer abuse, Cooper indicated.

The "mischief" charge, brought under Section 387 of the code, is a vaguely defined term which can only apply in this matter if computer time can be considered "property," Cooper explained.

Section 287 defines telecommunications as "any transmission, emission or reception of signs, signals, writing, images, sounds or intelligence of any nature by radio, visual, electronic or other electromagnetic system."

Theft of telecommunications occurs, according to 287, when anyone "fraudulently, maliciously or without color of right abstracts, consumes or uses electricity or gas, or causes it to be wasted or diverted, or uses any telecommunications facility or obtains any telecommunications service."

'Stealing' Telecommunications

If the defendants used CRTs linked via phone lines to the Amdahl 470 in the course of their alleged access, then under 287 they have "stolen" telecommunications, according to the Toronto attorney.

"But that is hardly the relevant part of what they did," Cooper said, adding "the value of the transmission facility [or telephone medium] would have been less than $200, which makes them punishable only by summary conviction.

"I don't think that 'stealing time' is really caught by this section . . . The intent [of 287] is to help Bell Canada and the other telecommunications carriers with 'blue box' setups," he said. "Blue boxes" are devices used to operate telephones in a clandestine manner to avoid billing.

"I think there is only a very remote possibility that they will be convicted under that section," Cooper said.

Under Section 387, anyone commits "mischief" who "willfully destroys or damages property; renders property dangerous, useless, inoperative or ineffective; obstructs, interrupts or interferes with the lawful use, enjoyment or operation of property; or obstructs, interrupts or interferes with any persons in the lawful use, enjoyment or operation of property."

"Our jurisprudence is not terribly clear on what 'property' means, but it would probably have to be something fairly tangible," Cooper said, adding "computer time per se would probably not be property unless the judge were awfully creative."

Cooper indicated that other criminal code sections might have been applied in this case — such as 338, the fraud section, or 361, which addresses impersonation.

However, these alternatives may have been rejected by the prosecution since the UA abuse did not involve embezzlement or misuse of an account under the name of some innocent party, he speculated.

"My personal opinion has been that the theft of computer time alone is not a crime, unfortunately," Cooper said.

The trial will apparently focus not on what the students allegedly did but on what to *call* what they did, Cooper indicated, adding their intent — purportedly "playing" rather than making money — seems of little import in view of the law cited by the prosecution.

Intent has in the past been a critical factor in deciding some Canadian computer abuse cases involving unauthorized disclosure of confidential data [CW, May 29].

Computer law experts agree the trial of the three ex-students, slated to begin in Edmonton, Alberta, this December, will set a precedent in Canadian law. The trial may also show that the law as it now stands cannot handle most kinds of computer abuse in Canada and may suggest similar inadequacies in U.S. jurisprudence as well.

Senate Urged to Revise DP Crime Bill

(Continued from Page 1)

Chickering & Gregory.

S. 1766 also needs much exposure in order to give those in the computer field time to alter many of their current practices and to give the judicial system the opportunity to prepare for enforcement and prosecution of cases under a computer crime law, Parker said.

If S. 1766 were passed by Congress in the near future, it would make criminals of many honest and dedicated computer personnel, he stated. Anyone in the field who follows the common practice of making unauthorized use of computers for such activities as playing games, printing Snoopy calendars, calculating bowling scores and maintaining church mailing lists could be charged with a felony under the law as it is currently drafted, Parker warned.

These acts would no longer be ethical issues, winked at by management, but federal crimes punishable by up to 15 years in prison and $50,000 in fines, the consultant said.

Another time-honored practice that will be unacceptable should this bill become law, he added, is the belief of many programmers that as the authors of their programs, they have the right to trade, give away or make personal use of those programs even though their employers' resources were used in their development.

"These concepts and practices ingrained in the computer field will have to be drastically and quickly changed to ensure that the proposed law will start its life with respect and in an absence of gross and pervasive violation," Parker stated. "This will require a period of time for intensive exposure of the concepts in this bill in trade literature, professional society and trade association meetings, discussions and debates to swing practice in line with proposed law."

Licensing Opposed

Both Parker and Nycum, his co-investigator in a now eight-year-old National Science Foundation effort to study computer crime, expressed their hope that the proposed law will not lead too rapidly to the development of licensing and certification for computer systems or practitioners.

"I am totally opposed to [licensing and certification] at this tme due to the lack of standards in this new and radically changing industry and discipline," Nycum told the subcommittee.

From a strictly academic analysis of existing federal laws used in the past to prosecute computer crimes, Nycum believes most unauthorized acts against or involving computers are already illegal. But what is theoretically possible isn't always practical for a prosecuting or defense attorney faced with applying federal laws against wire and mail fraud to a case filled with new and complex technological facts, she said.

While legislation that would make certain actions involving computers a crime is "very desirable" at the federal level, such laws are "very necessary" in the states, particularly in cases involving the theft of computer programs or the misappropriation of computer time — cases in which it is difficult to prove that something "tangible" has been stolen or misused, Nycum added.

The attorney identified a number of cases that the bill, as it is presently worded, would not cover. Among these are civil rights and discrimination cases in which, for example, a computer program is used to screen out minorities and those instances where information, data or programs are taken but not used.

Law Enforcement Fear

For its part, the law enforcement community, represented at the hearings by the Department of Justice and the Federal Bureau of Investigation, supports the Ribicoff legislation as a powerful investigation tool that will see much use in efforts to combat sophisticated white-collar crime, but fears that the proposed law would cover violations of nearly every computer system in the country.

"It would be impossible for the FBI, armed with this legislation, to enter the field of computer fraud in a wholesale fashion with our current investigative resources," according to special agent Joseph F. Henehan, chief of the FBI's white-collar crime section in its Criminal Investigative Division. Even with an increase in resources to go after computer-related crimes, close cooperation with and help from state and local authorities would be required to guard against duplication of effort and failure to investigate a case.

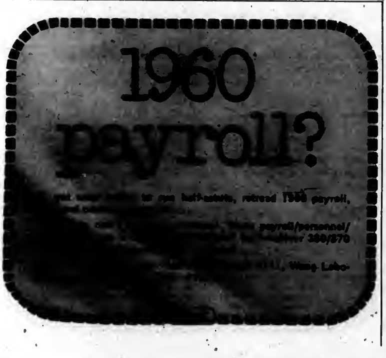
Training Problem

The FBI would also be faced with a serious training challenge, given the need for technical expertise in handling computer fraud matters, Henehan added.

Similarly, John C. Keeney, acting assistant attorney general for the Justice Department's Criminal Division, said the department "has no interest in prosecuting every computer fraud and abuse case occurring in the U.S."

But the Justice Department does believe federal jurisdiction in computer crime matters should be 'broad' and concurrent with state authority, Keeney said. Without "a compelling federal interest," the department would defer most investigations and prosecutions of computer crimes to the states and localities, he suggested.

While no less than 40 federal statutes can be applied to such crimes — not one of which was designed with computer-related fraud and abuse in mind — their success in a courtroom is particularly uncertain, Keeney stated. "In our view, a specific statute would achieve a greater deterrent effect than existing criminal statutes which may, through strained interpretations, be available for prosecution purposes," he said.



May Not Cover Computer Abuse

DP Service Theft Case to Test Canadian Code

By Brad Schultz
CW Staff

EDMONTON, Alta. — Canadians may discover their criminal code does not apply to most computer abuse cases when three former University of Alberta (UA) students stand trial here in December for allegedly issuing themselves unauthorized accounts on the main UA computer system.

The three have been charged with stealing "telecommunications services" — a federal offense — for allegedly accessing UA's Amdahl Corp. 470V/6 mainframe through CRT terminals linked over telephone lines.

Canada's criminal code has no section devoted to computer abuse, except in the area of privacy law. In handling most computer-abuse cases, Crown prosecutors must therefore apply such broadly stated sections as those that pertain to "theft" of telecommunications services, fraud and even misuse of energy resources.

So, while the three face possible 10-year prison terms, a number of legal experts consider conviction unlikely, largely because they doubt current Canadian law applies to the case — at least in the way it is being interpreted by the Canadian Attorney General's office. But none doubt the case will set a precedent in that nation's jurisprudence, whatever the outcome.

The defendants are charged with theft of telecommunications services under a criminal code section written, in the opinion of informed sources, to deter use of a telephone in a way that precludes billing. They are also charged, under another section, with "mischief," which is defined as interference with "the lawful use, enjoyment or operation of property."

Early last year, the three "bypassed the normal protection mechanisms" on the university's 470 in order to "play with it," according to UA computing service professor, Anthony Marsland, who knows all three individuals.

"They weren't selling their time or their knowledge on the side, or anything like that, but they were, in the last stages [of their activity], interfering with the operation of the computer," Marsland said.

The level of security on the 470-driven Michigan Terminal System (MTS) at UA — the "workhorse of the campus" with about 200 terminals connected — was especially low at the time.

Techniques Well-Known

Intrusion techniques were common knowledge among a number of UA students, having been developed by undergraduate and graduate computing science majors as faculty-approved projects, Marsland continued.

The three individuals who are now defendants — one a full-time engineering major, since graduated, and the other two part-time "fringe" students — derived a rough sense of these techniques from conversations with computing science students and succeeded in applying them through a process of experimentation, he said.

They logged on in a normal way, gave themselves a privileged status on the system and reserved portions of memory for their own use, Marsland said, adding they were able to give themselves unissued accounts on the system by altering its accounting records.

Since UA grade transcripts are stored on a separate computer system, the possibility of changing such records could not even have been considered by the students, he indicated.

A number of security breaches have been detected at UA's MTS since 1976, and at the time of this particular alleged abuse a "loop protection mechanism" was already on order. It was installed last January, Marsland said.

Considered similar to an installation at Rensselaer Polytechnic Institute in Troy, N.Y., UA's MTS features about 5M bytes of memory, IBM 3350 disk units, a high-speed paging drum and a "large number" of magnetic tape drives, he noted.

Attempted Violations

Ironically enough, some of Marsland's "most promising" students have been trying to violate the new protection in order to better understand it. Although setting up unauthorized accounts is forbidden, UA's computing science faculty views student attempts at simply penetrating system security as an expedient in trying to understand the nature of data base software.

"Really, I am concerned with ensuring that computer systems are as secure as possible. And one way to do that is to determine what [their] weaknesses and deficiencies are," Marsland said.

The matter at hand is not properly a judicial concern and it is not clear whether the facilities involved may truly be called "telecommunications," Marsland observed.

The defendants "would certainly deserve having the book thrown at them" if they had been motivated by monetary profit in their alleged activities, he declared, but said that since this was not the case, any punitive action against the individuals should only be decided by university officials.

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International Data at Issue

Informatics Meet Promises Hot Political Debate

TORREMOLINOS, Spain — The 10-day Intergovernmental Conference on Strategy and Policies for Informatics (Spin) promises to be one of the most political computer-related meetings of this year when it gets underway Aug. 28 [CW, April 17].

Jointly organized by the Intergovernmental Bureau for Informatics (IBI), based in Rome, the United Nations Educational, Scientific and Cultural Organization (Unesco) and the Spanish government, the meeting is expected to draw delegations from more than 80 countries both to the sunny beaches and to the hot political debates.

Less developed countires (LDC) will be heavily represented. More than 100 of these nations banded together at the UN Committee for Technical Assistance and Development (Unctad) meeting in Nairobi 18 months ago to demand more access to information held by the industrialized nations and they are sure to press those demands here.

The major Western power in the IBI organization that is putting the conference together is France, and other members include Algeria, Argentina, Bolivia, Brazil, Cameroon, Chile, Cuba, Equator (formerly French Equatorial Africa), Spain, Gabon, Ghana, Iraq, Iran, Israel, Italy, Jordan, the Malagasy Republic, Morocco, Mexico, Nigeria, Senegal, Swaziland, Tunisia and Zaire.

The U.S. is not a member — because "we don't support the pretensions of the organization," according to the State Department — but will send a "small" delegation to the conference and will present a paper on how three U.S. states have implemented computers and information systems.

Because of the heavy LDC orientation of the conference, there is expected to be a hot debate over the access to information in Western data banks, sources indicate, and conflicts between the less and more developed countries over information policy are expected to dominate the meeting.

A preview of such debates will take place within IBI itself in July when the contract of the present director-general, Fermin A. Bernasconi, comes up for renewal. While he is backed by the French — who contribute 30% of the IBI budget — there will be two other candidates for the job, one backed by the South American members and another backed by the Middle Eastern countries, led by Marxist-oriented Iraq.

Either of these candidates would be expected to take the organization into an anti-American stance, sources indicated, adding, however, that France can probably round up the votes for its candidate.

For the conference, the IBI General Assembly has set the following topics for consideration:

- Accelerating the transfer and application of computer/communications technology to developing countries.
- Initiating programs in all countries for indigenous capabilities in information resources.
- Encouraging developing countries to take a more active role in formulating international data transmission policies.
- Integrating informatics with major national educational, industrial, communications and social policies.
- Recognizing the power of informatics in affecting national sovereignty and democratic control over the destinies of nations.

The conference may come out with an agenda for the establishment of a new world information order, and at least one U.S. executive has predicted that "if there is an information war coming, some of the first volleys may be fired" at the meeting here.

U.S.-Funded Net Would Serve LDCs

(Continued from Page 1)

might be a hot topic of conversation at this summer's LDC-dominated Spin meetings.

Satellite Network

Under the proposal, a worldwide satellite network might be established to provide high-volume, low-cost information links between the LDCs and the U.S., State Department officials said. A variation of this proposal would include regional networks, possibly in Latin America or Africa, linked separately to the U.S.

Either plan would be subsidized by the U.S.

In the LDCs themselves, the U.S. would also subsidize terminal facilities, probably located either in the U.S. Information Agency offices in those countries or in the government agencies making the most use of the services, according to proposals under consideration.

Furthermore, the government would subsidize access to the publicly available data bases in the U.S. and would maintain catalogs of data base material available from U.S. private sources.

However, the government would not subsidize the use of these private files by LDCs, instead leaving it to the country in question to work out a contract with the private firms involved.

Barriers to Effective Use

The U.S. government is "very much interested" in helping LDCs gain access to information in U.S. data bases, one official said, but he noted several problems that need to be overcome before that information can be used effectively.

This story was developed by Rex Malik, a British freelance journalist in London, and E. Drake Lundell Jr. of the CW staff in the U.S.

Along with this, there is a great need for training of personnel in the LDCs, he added.

To date, the U.S. has been working to help fill these needs primarily through UN organizations, he said.

On the UN Secretariat level, for example, the U.S. has sponsored a proposal for a technical information exchange network.

Furthermore, there is an Industry, Technology and Information Bureau in the UN Industrial Development Organization (Unido) which is sponsoring a four-pronged, 18-month to two-year project in training LDCs to use existing data bases and exploring ways to tailor those data bases more to the needs of the LDCs.

Controversy Likely

However, when and if the U.S. makes its formal offer to underwrite the communications and terminal costs for such a system, the sparks are sure to fly.

Europeans are increasingly concerned about data that is flowing out of their countries and into U.S. data banks and many countries are currently studying ways to slow this transborder data flow, particularly in the area of information about private citizens.

Most European governments would not sit idly by and watch the U.S. in turn spread this information around the world, some Western European sources indicated.

In addition, the European governments would oppose such an idea on the grounds that it would lock the users in the developing countries into U.S. data bases and technology, thereby foreclosing that opportunity to Western European computer firms and data base suppliers, which are largely government supported.

Communist Bloc Reaction

Furthermore, the reaction from the communist bloc countries could also be expected to be negative, sources said, since they might see the move as an attempt to politically influence the LDCs in favor of the West.

In particular, some Third World countries, LDCs themselves, may charge that the U.S. proposal is a new form of economic imperialism designed to overwhelm the LDCs and their cultures.

Other LDCs that might favor the proposal in general might oppose some of its specifics, a U.S. source said. For example, the U.S. has developed large data bases on the resources of developing nations based on information gathered via remote sensing satellites, he said.

Already some of these countries have demanded that the U.S. turn such data over to them and that its dissemination to others be restricted, a State Department official said.

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Picks Promising Land Parcels

Service Lowers Odds in Federal Oil Lottery

By Tim Scannell
CW Staff

BEDFORD, Mass. — Each month, thousands of Americans, enticed by visions of financial independence, pay $10 for a ticket in a government-operated lottery whose prizes could eventually net the winner more than $100,000.

The raffle is conducted by the Department of Interior's Bureau of Land Managmeent (BLM) and the prizes consist of oil and gas lease rights to federally owned land in the Rocky Mountain states. The BLM offers about 600 to 700 parcels of land every month and sells an average of approximately 2,400,000 tickets to hopeful participants each year.

Initiated in 1960, the lottery has given birth to several firms which, for a fee, will file a client's application and provide various services that might theoretically lower the odds against a participant. These services include obtaining the government's parcel list and procuring accurate geological reports.

One such company, Petrodata, Inc., uses two Digital Equipment Corp. PDP-11s to process and correlate the reams of data to isolate desirable parcels. The object of entering the lottery, according to Charles Adams, president of the firm, is not only to win a tract of land, but to win one containing a deposit of either gas or oil.

Petrodata was founded by Adams in 1974 and has been used principally by him and his family for personal speculation and parcel selection. "We started with the idea of looking for some clients, but we didn't actually begin actively soliciting them until a few months ago," he said.

"We're primarily interested in people who want to file a fair number of applications," Adams continued. "Somebody who wants to file a few cards a month has to think of it as strictly a lottery in which the chances of winning are not very high. However, people who are able to file 30, 50 or 100 or more per month can expect to win a drawing more often and can consider it more of an investment than a lottery-type gamble," he stated.

Winners in the federal contest are issued leases for each of the plots of land. The person pays the government a fee, usually $1 an acre per year, and can hold the land for up to 10 years without starting any production or drilling activity, Adams said. After that time, the land reverts back to the lottery and the system repeats itself.

If, however, a speculator decides to drill on the winner's land, that person can retain the lease as long as there is commercial production going on.

Oil companies are usually interested in about one-fourth of the raffled parcels and, depending on their proximity to producing wells, will offer the lottery winners anywhere from $3,000 to $100,000 to obtain the drilling rights.

In addition to receiving payment from the oil or gas companies for the right to drill on a particular parcel of land, the winner is also entitled to royalties on any oil produced during exploration. Adams himself has been getting $1,500 a month in payments from an oil company that has been leasing one of his plots since 1975.

The popularity of the government lotteries has increased over the years, Adams claimed, especially since the oil and gas companies have exhibited more interest in exploratory drilling. "Some of the parcels are so unpromising that they draw none or very, very few applicants," he pointed out, "while a few of them are so popular that they draw as many as 8,600 applicants."

That is why Adams, a former adviser on DP for Exxon Corp.'s Creole Petroleum Corp., believes it is important to consider such things as geological surveys and the number of drillings that have produced oil or gas. Without such information, which is public record, the odds against winning a desirable parcel are increased, Adams noted.

PDP-11s After Hours

The system is composed of two PDP-11s made available after hours by the Data Syntecks Corp., of which Adams is president. The configuration is used to compile all of the available information on each parcel offered by the BLM as well as the drilling and geological data, Adams explained.

The systems are also used by Adams to predict how many cards will be bought on each tract and how much the oil companies might be willing to pay the winner for the drilling rights.

Although the PDP-11s' assistance helps to considerably lower the odds against the participant, Adams admitted that "you still tend to fly somewhat blind" in making selections. "There's no way of exactly knowing how much each parcel sold for or how many applicants each one drew," he noted. "Therefore, you can't see if you've picked the best ones" from the total number listed by the BLM.

There is, however, no guarantee that an oil company will buy the rights to a winner's tract of land. Drilling for oil is "a highly speculative, entrepreneurial area in general," Adams noted. "It costs anywhere from $100,000 to $1 million for someone just to drill the hole."

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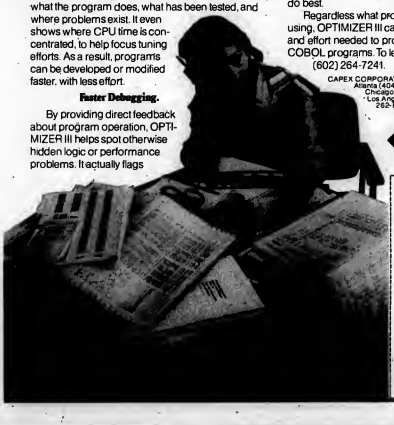

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More Americans Fearing Loss of Privacy

NEW YORK — Seventy-one percent of Americans believe they "begin surrendering their privacy the day they open their first charge account, take out a loan, buy something on the installment plan or apply for a credit card," a recent Harris Survey found.

Sixty-seven percent felt that way last year [CW, May 2, 1977] and 48% in 1974.

A 61% majority said it believes "the Internal Revenue Service is not keeping individual tax returns confidential," and 62% called this practice a "very serious" invasion of privacy.

"Credit businesses are selling information about an individual's credit standing," 79% believe, and 60% see this as a "very serious" invasion of privacy.

Wiretapping and electronic surveillance were of even greater concern, according to the Harris Survey of 1,458 U.S. adults. Of those surveyed, 85% believe "illegal wiretapping and other forms of electronic surveillance" are "probably" or "surely" going on in America today, and 82% see this as "very serious."

Other "invasions of privacy" American believe are now quite common include unsolicited phone calls selling products or services, unsolicited mail advertising products or services, personal questions by banks and loan companies in connection with loan applications and the use of the Social Security number as an identifier on various records.

Amdahl 'Assist' Package Puts MVS/SE Work on 470

(Continued from Page 1)

compatible — processor series, Amdahl's Assist is comparable in function to packages available from several IBM 360 leasing companies that allow those older machines to accept and work with standard IBM 370 instructions.

Introduced by IBM when the 3033 was announced in April 1977, MVS/-SE — the "SE" stands for "System Extension" — has been described as providing significant enhancements to MVS systems by implementing several frequently used system routines in firmware. Without this SU, the MVS operating system cannot take advantage of the enhancement features built into the 30 series processors, according to one industry source.

In one test situation, the throughput of an Amdahl 470 running with IBM's MVS/SE and Amdahl's Assist was substantially better than the throughput of a 470 using IBM's "standard" OS/MVS, but not quite up to the performance of MVS/SE running on an IBM Series 30 CPU, the IBM competitor acknowledged.

In the same test, supervisor state execution was similarly reduced on the Amdahl setting with Assist, but not to the extent it dropped when MVS/SE was used in its native Series 30 environment, the Amdahl spokesman said.

MVS/SE Assist is activated when an IBM 370 extended instruction is executed on a 470. An operation exception program check is intercepted by an MVS/SE Assist routine in front of the program check first-level interrupt handler and the Program Status Word (PSW) is analyzed to determine what operation has been requested.

MVS/SE normally replaces the interrupted instruction with a branch to an appropriate simulation routine, leaving the branch in place to avoid further program check interruption overhead, Amdahl said.

No Changes Needed

No changes in 470 hardware, in existing MVS/SE instructions or in any other programming are required to enable users to make a smooth transition to the MVS/SE environment on the Amdahl equipment, the spokesman said.

The Assist software is added to an MVS/SE system by performing a linkage edit of the system control program nucleus; no external operating considerations, turning parameters or linkage interfaces are involved, he noted.

MVS/SE Assist routines occupy about 1,500 bytes in the MVS nucleus, he added.

In a benchmark reported by Amdahl, the measured environment was a commercial batch jobstream running concurrently with 48 simulated, active users of IBM's Time Sharing Option (TSO); OS/MVS Release 3.7 was on an 470V/6-II with 8M bytes of real memory. All required MVS SUs were installed, including MVS/SE and RMF-11, the spokesman continued.

With IBM's Trace routine on, MVS/-SE Assist provided a 13% reduction in supervisor state execution. System throughput capacity increased by 12%.

With Trace off, MVS/SE Assist provided an 11% reduction in supervisor state execution and a system throughput increase of 10%, he claimed.

Actual performance will vary with customer environment and system workload, the spokesman noted, adding that the performance improvements provided were meant simply as a "reasonable reference point."

IBM has released performance information on MVS/SE stating that the addition of the SU reduced supervisor state execution time by 20% to 27%, and improved uniprocessor throughput by 14% to 17%, apparently on a 3033 processor.

Amdahl's MVS/SE Assist will carry a monthly license fee of $250. The basic MVS/SE SU costs another $1,250/mo from IBM.

Amdahl is at 1250 E. Arques Ave., Sunnyvale, Calif.

Map Helps Cyclists Make Milestone Trip

(Continued from Page 1)

mathematics to a specific area when the altitudes of the terrain within that area are known, Schramko explained.

Cross-Section Produced

The computer uses this information to produce a cross-section of the ground contour in terms of altitude and distance. This data is then used to select impact and measuring-point locations for missile test firings so any point in the area, regardless of the altitude, is observable from at least one of the monitoring locations.

The computer and COM unit basically solve the problem of "where you put the explosion based on the fact that you only have a limited number of observation sites," Schramko said. Theoretically, if a straight line can be connected to two points along a plotted line without intersecting the contour line between the two points on the graph, the two points should be visible to each other by line-of-sight, he added.

Schramko used a Univac 1110 mainframe at NWC, and an Information International, Inc. Comp-80 COM recorder to produce the maps for his cycling expedition. The Comp-80 was under the control of a specialized graphics package Disspla, developed by Integrated Software Systems Corp. The software enabled the scientists to transform statistical data from a series of numbers into readable charts and graphs.

Input Modified

In order to be processed by the CPU, the data that was input had to be modified to include some known cycling parameters. For instance, Schramko established through experimentation in earlier trips that approximately one pint of water is required for a cyclist to travel about 28 miles along gently rolling desert terrain. If the terrain has an uphill grade of 8%, for example, the distance the cyclist can travel using one pint of water drops significantly, to about three miles.

With this information, the computer was able to schedule water stops for the trip according to the grades which would be encountered along the route. Since many of the stops did not coincide with water sources, water had to be left at the computer-selected stops in advance of the riders.

'Nothing Arbitrary'

"There is nothing really arbitrary that goes into the computer," Schramko pointed out. "It's digitized map information and that's all. Everything on the map is calculated and based on the digitized distance from starting point and elevation, and those are the only input to the program."

Besides mapping distance and contours, Schramko pointed to other uses for the COM unit and specialized software. "For instance, we are presently drilling for geothermal steam here at the NWC to be used as a source of energy. We've taken a lot of readings and would like to plot those readings against such variables as distance and area.

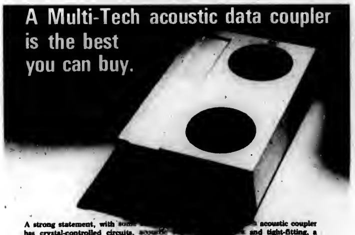
"Eventually, we'd like to get a graphic contour of the earth's temperature, 100 feet below the surface level," he said.

Map Available

The map produced by the computer for Schramko's expedition was made available to cyclists who last month participated in a two-day, 99-mile race sanctioned by the U.S. Cycling Federation. The event, which involved traveling over part of the route traversed by Schramko and Kratzke, covered approximately 100 miles from the northern boundary of Death Valley to a campground at the Mt. Whitney Portal.

Although Schramko's cycling trip did have a scientific purpose — to debug and verify the accuracy of the computer output — the primary motivation was a personal desire for accomplishment. "The trip was undertaken just to see if it could be done," Schramko remarked.

If anyone else wants to see if it can be done, the map is available from the Lone Pine Chamber of Commerce, P.O. Box 552, Lone Pine, Calif. 93545.



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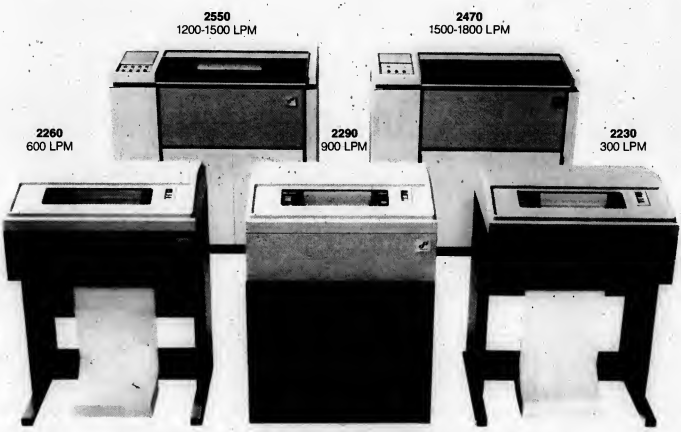

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Professor Looks at EFT and 'Quality of Life'

By a CW Staff Writer

ANAHEIM, Calif. — How will electronic funds transfer systems now under development affect the "quality of life"?

This question was addressed at a recent conference here by Dr. Rob Kling, assistant professor of information and computer sciences at the University of California at Irvine.

According to Kling, who based most of his presentation on a study performed by E. Gerson in 1976, the quality of life for an individual depends on his relative power in the social setting in which he functions as well as his relative social resources and satisfactions.

In order to consider the influences of alternative EFT arrangements upon the quality of social and institutional life, Kling examined their effect on six different aspects of social settings, including opportunities; ecology, or the extent to which EFT saves or consumes nonrenewable resources; and coordination, or the extent to which EFT affects the ease with which an individual can manage his activities in all settings.

Kling also looked at intelligibility — or the extent to which participants can understand social, organizational or technical arrangements; dependency, the extent to which one can live without EFT should it "fail" us; and agency, the extent to which someone can influence the social, organizational or technical arrangements in force.

Increased Opportunity

Kling noted that increases in "opportunity" are the raison d'etre of EFT. However, while EFT may bring financial services to people who otherwise wouldn't have them, EFT could also make possible "abusive surveillance and harassment" of unpopular political groups, for example.

In discussing "intelligibility," Kling noted that EFT can simplify or complicate specific transactions and financial contracts and can alter the demands made upon people to understand available products. "EFT systems become less coherent as they increase in versatility, scale and the extent to which they are coupled," Kling said.

To the extent that EFT systems replace current means of payment, Kling said, they will become more and more likely to entail hardship if they fail, as when power failed in the Northeast in 1965. In general, the larger the scale, versatility and accessibility, and the less costly EFT becomes, the more likely we are to depend on it, he said.

EFT systems can influence the control of either individuals or EFT-using institutions, Kling said. "While it may be easy to dicker credit with a small shop owner, EFT accessed through large institutions means one loses control over his financial arrangements," he said. Additionally, proposals for EFT systems usually neglect such things as stop-payment mechanisms that exist in current checking systems.

In the area of "ecology," Kling noted that some current EFT arrangements are used by banks to increase the volume of financial transactions. Ironically, a side effect of some "paperless" EFT systems is a net increase in the amount of paper flowing through the banking system, Kling said. Also, rising energy prices may shift the relative attractiveness of EFT services to traditional alternatives.

Requires Less Effort

Discussing "coordination," Kling said that in general, "people can spend less effort coordinating their lives in a society that depends on a large variety of EFT-related services to the extent that they lead to greater intelligibility, control and less dependency for people."

Kling concluded by listing areas needing further study. He said the market structure of firms using and providing EFT systems should be examined to determine which systems foster increased concentration among a few firms and which support a diverse array of small businesses. Important social costs should be identified and ways should be developed to internalize them into pricing schemes for EFT systems.

If social costs cannot be internalized into EFT pricing, he said, the industry should determine how to best inform the public about what they are. It should examine the structural role of consumers relative to EFT-providing institutions. It should understand which EFT arrangements are most consistent with a low-growth, rather than high-growth, economy, he said.

Finally, he urged that the industry learn how to develop EFT technologies so they are easy to roll back, if necessary, without major social upset.

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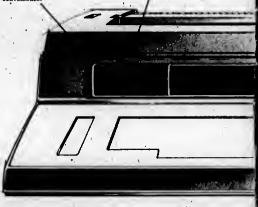

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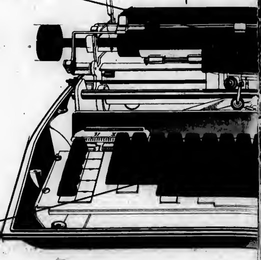

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Replacement Gear Not Covered

Many Lessees Underinsured, Report Cautions

By Brad Schultz
CW Staff

WINTER PARK, Fla. — Many users of leased computer hardware do not carry enough insurance to cover termination of the lease and replacement of the equipment if the leased gear were to be destroyed by natural catastrophe, a computer negotiations report has warned.

And to add insult to possible economic disaster, "full, adequate coverage" can be obtained for only "slightly more" than what lessees tend to pay for inadequate coverage, according to *CNReport*, Volume 2, Issue 2.

Users often obtain disaster insurance from the lessor, rather than from an insurance company. They are convinced the lessor — as a specialist in computer sales — can buy the policy for less and thus pass on the savings, the report indicated.

The price for this coverage is typically expressed in the lease schedule as a decimal multiplier of the monthly lease payment, the report said.

A user may not realize until after its computer facility has been gutted by a flash fire that under terms of the lease it must continue making all payments and must provide replacement equipment, the report explained.

The only possible "out" in this predicament is for the user to pay a full "termination value" specified in the lease agreement — a large sum that is not matched by the insurance coverage.

"The insurance procured by the lessor does not even name your company as an 'insured' or an 'additional insured' under the policy," *CNReport* said, explaining "the primary 'insured' named is the bank that furnished the senior debt financing for the hardware." Other insureds are "the equity investors in the leased hardware and the lessor himself," the report added.

Not Insured Against Causes

The user's policy may insure against the results of disaster, but not against the causes: For example, computer fires are typically caused by short circuits or other electrical mishaps, the report noted, but disaster insurance may not cover the "blow-out" of components that precipitated a fire.

Hence, the policy may apply to damage that resulted from a fire without applying to the lost and very expensive components that were the fire's source.

CNReport advised users acquiring insurance on third-party leased hardware to determine the liability of all concerned in the event a disaster strikes and ensure that the lease contains a termination value as a possible "out."

It also urged users to obtain a number of bids on specified coverage from a personal broker and carefully compare these bids.

If coverage by the lessor seems unwarranted, users should obtain the prospective policy and premium quotation before signing the lease and should carefully evaluate coverage amounts and exclusions, *CNReport* said.

If the lessor is to furnish the insurance, the lessee should try to delete any lease provisions that excuse the lessor from any liability to provide adequate insurance coverage, the newsletter said, adding that the lessee should be named as an additional insured under the policy, with payment as the lessee's interest may be evident.

In addition, the newsletter urged users to be sure the insurance cannot be cancelled without 30 days' advance notice to the lessee and to seek advice from legal counsel and insurance experts on all aspects of the prospective coverage.

If the lessor is to furnish the insurance, the lessee should receive copies of the policy, all premium notices and evidence of premium payment. In addition, the choice of the insurance carrier should be subject to lessee approval, and the lessee should be allowed to supply the insurance through its own carrier, *CNReport* said.

CNReport is published monthly by International Computer Negotiations, Inc., 1331 Palmetto Ave., Winter Park, Fla. 32789.

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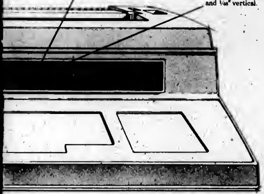

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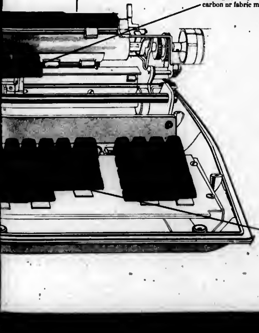

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Surprisingly enough, however, the Sprint 5 costs no more than competitive terminals.

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Maintenance Contracts at Issue

User Suit Charges Univac With Trade Restraint

By Howard A. Karten
CW Staff

NEW YORK CITY — Robert Heller Associates, Inc., a management consulting concern here, has filed a lawsuit against Univac, charging the Blue Bell, Pa., computer manufacturer with activities in restraint of trade under the Sherman Antitrust Act.

The suit, filed recently in the U.S. District Court for the Southern District of New York, alleges that in negotiating renewal of equipment leases and maintenance contracts, Univac forced Heller against its will to execute maintenance contracts on all the equipment. Heller said the previous owner of the equipment, New York University (NYU), had a contract with Univac that exempted two pieces of equipment, the CPU and an I/O channel expander, from the maintenance contract.

Heller has also charged it was subject to the economic dominance of Univac since its ability to keep its customers and attract new ones requires uninterrupted operation of its computer facilities. Because replacement of the Univac equipment by a third party would have required lengthy delays, Heller had no alternative except to continue to rely on Univac, the user said.

NYU had an arrangement with Univac under which it was charged on a time-and-materials basis for maintenance of the equipment, instead of a monthly maintenance agreement with fixed monthly charges, according to the lawsuit. Forcing Heller to sign maintenance agreements for all the equipment as a condition of renewing the lease for the hardware was a violation of Section 1 of the Sherman Act, Heller has claimed.

Under the provisions of the act, Heller is seeking treble damages and attorneys' fees. Univac has until July 5 to answer the suit.

D.C. Fighting Bus Crime With Mini-Based Tracking

By Marguerite Zientara
CW Staff

WASHINGTON, D.C. — In response to an increasing number of crimes against bus drivers and passengers, the Metropolitan Transit Authority here recently instituted a computerized bus tracking system to help pinpoint the location of a bus when its driver activates a radio-controlled; silent alarm connected to the central control office.

When a bus driver activates the alarm, the bus' identification number is automatically transmitted via two-way radio, to a Digital Equipment Corp. PDP-11/35 minicomputer. In memory, the bus' identification number accesses the bus' transportation assignment for that day and is compared to the "checkpoint file," which pinpoints where a bus should be at a particular moment if it is on schedule.

A console operator, working at one of eight TEC, Inc. Datascreen 415 CRTs in the divisional offices, sees on the screen the bus identification number, the bus' transportation assignment and the geographical point where the bus should be if it is on schedule, according to Joseph Greenway, head of the transit authority's Systems Maintenance Division.

The central control office then calls the Police Department, which dispatches personnel to the scene of the incident.

"If the bus is off schedule, the program doesn't work as well, but it still works," according to Marilyn McGinty, spokeswoman for the Metropolitan Transit Authority.

In setting up the system, 85,000 cards had to be punched with the district's bus schedules. There are 750 bus routes in the district and as many as 1,650 buses can be in service.

Even though the silent alarm equipment was installed a year ago, the task of punching the schedule cards was a "back burner item," done "when the operator could get to it," according to Greenway. Daily updating of bus assignments is done via the divisional CRTs, a task that takes "an hour or so," he added.

The complete system, including radios, costs $5 million to install. Greenway said so far he is "very pleased" with the system.

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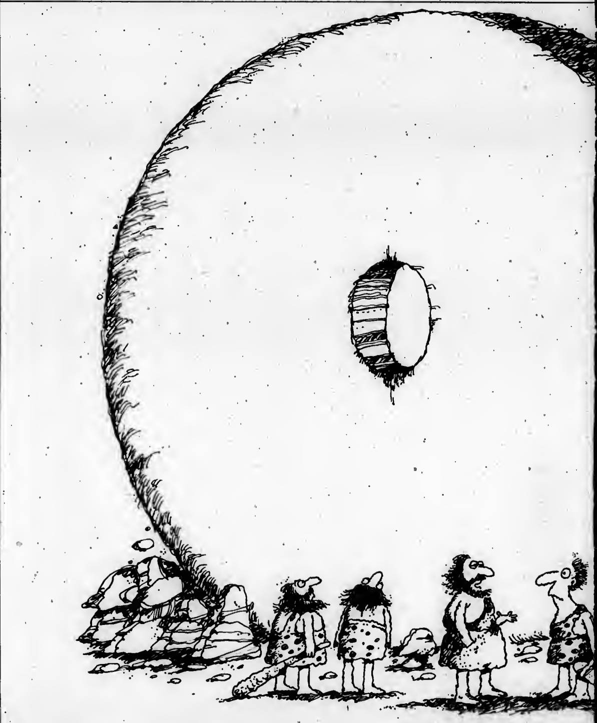


"It's been done."

Revamp Team Faults Federal DP Management

By Edith Holmes
CW Washington Bureau

WASHINGTON, D.C. — President Carter either needs to put the "M" back in "OMB" — the Office of Management and Budget — or establish a new agency that would focus primarily on management planning and policies for the entire executive branch, according to the President's DP reorganization team assigned to review DP and communications in the departments of Justice and Treasury.

"The absence of consistent management practices in the federal government is the major cause of most of the problems with information resources" and with the use of the computer and communications technologies on which these resources depend, the general government team said.

Without better management procedures and practices, the Justice and Treasury departments can't improve their use of these technologies, the study team concluded.

In addition, the team's draft report stated that management and technical assistance needs to be available to the several departments and agencies on a much broader and more standard scale. Ideally, this assistance would be independent from the day-to-day operations and control of such departments as Treasury and Justice so that candid, unbiased advice could be given.

Relatively few agency managers know how to direct an assessment of their needs in the context of a long-term information system or to evaluate this technology on the basis of their agency's mission requirements, the reorganization team found.

Boosting Assistance

Management and technical assistance could be expanded by increasing the staffs, resources and visibility of such existing facilities as the Federal Computer Performance Evaluation and Simulation Center and the U.S. Navy Cobol Center. These organizations could be reorganized in a "revitalized" Institute for Computer Sciences and Technology at the National Bureau of Standards (NBS), or at each of the Cabinet-level departments.

Whatever strategy is adopted, "a commitment is needed to expand the quality, quantity and types of assistance — whether provided by the government directly or purchased commercially or both — and to place a much greater emphasis on the need for managers and users within the agencies to take advantage of this assistance," the draft report stated.

The general government team also called on Carter to implement the Brooks Act more fully. That law — which split the central responsibility for effective management of federal DP among OMB, NBS and the General Services Administration (GSA) — should not be changed, according to the reorganization team. Rather, "the burden remains within the executive branch to provide the leadership necessary to improve information resource management," the team said.

Since the Brooks Act was passed by Congress in 1965, the federal government has been faced with the need to bring information resources under management control. Congress has lost confidence in the executive branch's ability to manage these resources and their underlying technologies, and more agencies and congressional committees have become "intimately" involved in the details of individual agency proposals for computer system upgrades or replacements, the draft report noted.

Individual managers with responsibility for an agency's tasks or mission have little real authority for acquiring the DP and communications tools they need, the team found.

'Overcontrol of Technology'

This "overcontrol of information technology has led to a system of management by red tape in which persistence, luck and pseudo-illegalities count as much or more than logic and reason," the reorganization group concluded.

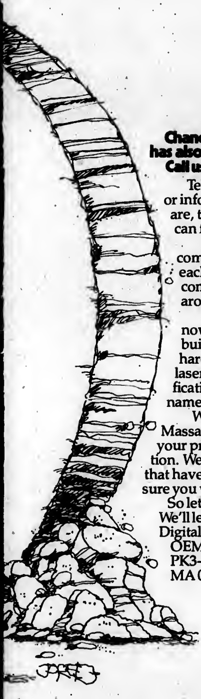
The Justice Department's Federal Bureau of Investigation has run into these problems in its effort to upgrade its National Crime Information Center, and the Treasury Department's Internal Revenue Service has been forced back to the drawing board as a result of criticisms of its proposed Tax Administration System, for example.

Many agency managers simply ignore this procurement system or they bend its rules. But others have become "gun-shy" about even attempting computer system upgrades, the reorganization team said.

The general government group's draft report also highlighted the problem of hardware, software and people obsolescence in the Justice and Treasury departments. By failing to replace worn-out hardware, departments and agencies throughout the government keep their programmers busy patching systems rather than employing state-of-the-art programming skills and software.

The decreasing cost of hardware contrasts sharply with the higher costs of software and people, the team noted, and yet the government continues to be preoccupied with equipment.

Few appointed senior government officials remain agency heads very long — the average tenure is between 18 and 22 months — leading to an inability to relate political goals and priorities to the career staff responsible for information services, the team stated.



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Agricultural Pests Up Against New Enemy: DP

By Marguerite Zientara
CW Staff

FRESNO, Calif. — Computers are becoming the new "farmer's friend" in the age-old battle against insect pests. Because of the rising costs of pesticides and the continuing objections to their use by environmentalists, more and more farmers are turning to what the experts call "ecologically based methods of pest management" — methods aided by computerized mathematical projections of what a particular insect population will do in a certain amount of time.

"Ecologically based pest management is based on the natural mortality of crop pests; we attempt to control them with minimum damage to the rest of the life in the fields," according to Dr. Charles Summers, associated professor of entomology at the Univeristy of California at Berkeley (UCB). Summers is a research specialist working out of a university field station near Fresno.

Once an insect specialist has determined what insects are in a field after daily visits over a period of weeks, computers construct mathematical models that can predict how fast the pest population and the natural enemy population will grow, Summers explained. The projections are based on the numbers of insects present in the field and the conditions of the field.

In higher temperatures, insects develop more rapidly than in lower temperatures, Summers noted. After it is determined how rapidly a particular type of insect grows, how long the insect will live, how often it will reproduce and how many offspring it will have, the computer provides a readout of the projected total number of insects per unit area at any given point in time.

Edge for Enemies

After Summers gathers data about a particular field, he sends the information to his colleague and the major developer of the program, Dr. Andrew Gutierrez, also a professor of entomology at UCB, 200 miles away.

Gutierrez processes the information on Lawrence Radiation Laboratories' Control Data Corp. 7600 mainframe or on the CDC 6400 in UCB's mathematics department. The specialist then decides the best method of reducing the odds against the natural enemies of the pest.

"Generally what we try to do is make life on the farm more conducive to the natural enemy population and less conducive to the pest population," Summers said. "In alfalfa, for instance, if we cut down alternating rows, the pests will generally leave the area while the natural enemies will stay in the rows growing and multiply. By the time the pests return, the natural enemy has multiplied in sufficient numbers to control the pests." Summers said pesticides are used sparingly and only as a last resort if other methods don't work.

In order to get the service, California farmers buy pest management services from commercial firms. This computer service is furnished free because it is still in the developmental stages.

Exam for CDP Passed by 919

CHICAGO, Ill. — A total of 919 candidates out of 2,835 passed the qualifying examination for the Certificate in Data Processing (CDP) given last February, according to the Institute for Certification of Computer Professionals (ICCP).

The exam was offered at 136 sites compared with 124 sites last year. The largest number of candidates came from Illinois, California, New York and Texas, respectively, the ICCP said.

An analysis of the candidates prepared by The Psychological Corp. showed 35% were members of middle management and 49% held staff positions in education, government, financial institutions, insurance or consulting/service organizations.

Most candidates were between the ages of 26 and 35, but the number over 35 showed a "definite increase," the ICCP noted.

The next exam will be offered on May 5, 1979. Information on that exam is available from the ICCP at 304 E. 45th St., New York, N.Y. 10017.

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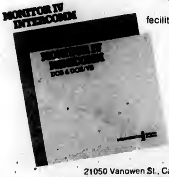

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For Users When Disaster Strikes

DPS Planning Recovery Operations Centers

By a CW Staff Writer

HURST, Texas — Recovery Operations Centers (ROC) — preconstructed facilities standing ready to accommodate computer installations — are necessary if American businesses are to avoid the "potentially devastating effect" of losing DP facilities when natural disasters occur, according to Louis Scoma Jr., president of Data Processing Security (DPS) here.

DPS is planning to construct five ROCs, which will be supported by the sale of memberships in the centers.

Scoma estimated that 90% of American companies using computers would have to shut down for months if their computers were destroyed. A ROC would include appropriate power supplies, air conditioning and humidity systems and communications networks, allowing a CPU to be installed immediately on behalf of a member company whose computer facilities had been destroyed.

No Alternative

Scoma sees no alternative to the development of ROCs. In almost all cases, he said, firms would not be able to turn to other companies for DP support.

"Most companies lack the compatibility with another company's computer operations, both from a hardware and software standpoint — assuming they could find availability," he said. "Most companies are operating their computers at or near capacity and cannot afford to provide backup support for another company for any extended period of time without affecting their own operations."

DPS intends to get written commitments from suppliers regarding the availability of computer hardware and the time within which it could be delivered and made ready for processing.

"There will be some equipment which members of the ROC will want to preorder and install because of the unique characteristics or long lead time," he noted. Such equipment might include check sorters, scanners, computer output microfilm equipment and optical character readers, he said.

Membership in the first ROCs will be offered to selected companies at $12,000 annually. A number of services will also be provided by DPS.

Members will be offered record storage and magnetic tape and disk file verification services for files stored at the ROC. The ROC will be made available to members installing a new computer system and phasing out an existing system.

Members whose computer facilities have been destroyed may use the ROC to house their new computers while their facilities are being rebuilt.

Texas Site First

The first ROC will be completed in the Dallas-Fort Worth area this year, after the selection of the first members, initially limited to 35 companies, Scoma said. Other facilities will follow during the remainder of 1978 and in 1979 in Los Angeles, Chicago, New York and Atlanta.

"The ROC will be large enough to accommodate the essential computer processing for any three of its members in the event they simultaneously experience a major disaster," Scoma said. For this reason, no more than three member companies will be located within a one-half square mile radius of each other.

DPS will also be able to make available, for staff support, as many as 150 hotel rooms within a 24-hour period, he said.

The five ROCs will be connected through a communications network to provide backup capability.

Fraud Conference Set On Board Cruise Ship

SURREY, England — An international conference on computer fraud will be held Sept. 20-25 aboard the Queen Elizabeth II on her scheduled Atlantic crossing from Southampton to New York.

The price of the conference for U.S. attendees, is $1,300 which includes a tourist class flight to Southampton and a "good" tourist berth to New York, according to the sponsor, 20th Century Security Education Ltd.

Comer to Speak

Among the speakers at the conference will be Michael J. Comer, author of *Corporate Fraud*, and Peter Hamilton, computer and security expert and a member of the Chubb worldwide security team.

Additional information is available from Peter A. Heims, Cleeve Road, Leatherhead, Surrey, England.

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Federal Board Rules on S&L Teller Machines

By Marguerite Zientara
CW Staff

WASHINGTON, D.C. — The Federal Home Loan Bank Board (FHLBB) has approved final regulations governing the use of remote electronic teller facilities by savings & loan (S&L) associations, including a number of consumer safeguards.

The action in late May preceded oral arguments scheduled for today, June 26, in a lawsuit filed by the Independent Bankers Association of America (IBAA) claiming the FHLBB has illegally entered the field of banking by giving S&Ls demand-deposit capability via electronic tellers.

The bank board has been authorizing remote teller facilities under temporary regulations on a case-by-case, "experimental" basis since 1974. The last extension of the temporary regulations expires June 30.

Under the final regulations, remote service units (RSU) can be used for crediting and debiting savings accounts, making loan payments and for "other financial related services." The board defined an RSU as an information processing device, including a computer system, located off the premises of a federal association and requiring an activator for access.

The definition excluded telephone banking systems, according to bank board attorney Lois Jacobs.

The regulations, which will take effect July 1, call for the consumer to have a machine activator such as a card or, in the future, fingerprint or voiceprint and a personal security identifier (PSI), not necessarily a number, Jacobs said.

The regulations stipulate that an S&L must disclose to a prospective customer all the terms of the agreement, including what happens if the customer's activator is lost or stolen. The association must tell the customer that the PSI is a security measure and that it should not be given out, written on the card or kept with the card, Jacobs said.

Correcting Statement Errors

A holder of an active account must receive a statement every month; a holder of an inactive account must receive a statement quarterly.

In the area of error resolution, a consumer must notify the S&L within 60 days in writing of any error on a statement. The S&L then has 10 business days after receiving the error notice to resolve the matter by either correcting the error or by furnishing written proof of the transaction as it appeared on the statement, Jacobs explained.

The regulations hold the financial institutions liable for RSU losses in most cases — if a transaction is not carried out correctly, if an error is not corrected within 10 business days of notification or if the bank processes a transaction from an unauthorized person — unless it can show the consumer was negligent.

The regulations provide that the customer must receive a receipt of each transaction printed by the machine; if the transaction is written, both the customer and RSU operator must sign the document, Jacobs said.

Privacy Provisions

Concerning the privacy of account information, the regulation allows an accountholder to access any information about his own account. However, except for generic data, no information can be disclosed to a third party except the bank board.

The FHLBB examiners need general information in their annual examinations of S&Ls' financial conditions, Jacobs explained.

The bank board, once it gets the information, is subject to the Privacy Act of 1974, she noted. "I think we've made excellent and specific attempts to keep account information private," she said.

When a federal association shares a system or has a contract with a third party, such as a merchant, the third party must treat account data as the association treats it, according to the regulations.

Security Clearance

The regulations state that an association needs a security clearance before filling out an application for establishing an electronic teller system.

If a system has anticompetitive implications, the board may ask the Justice Department to comment on it, Jacobs said.

Many of the recommendations made by the National Commission on Electronic Fund Transfers were implemented in the regulations, Jacobs said.

"All this time we've approved RSU systems in federal associations, so we know when they've worked and when they haven't. Hopefully these current regulations reflect the best thinking of these years of practical and philosophical experience," she added.

Lawsuit Issue

According to FHLBB counsel Harvey Simon, the issue in the lawsuit concerns a section of the Homeowners Loan Act stating that savings accounts are not subject to negotiable or transferable order or authorization, but may be subject to nonnegotiable order or authorization.

"The question is whether the machine-readable card used to access the savings accounts through an RSU is the same as a negotiable instrument. We think it pretty clearly is not," Simon said, adding that the bank board is optimistic about the outcome of the case.

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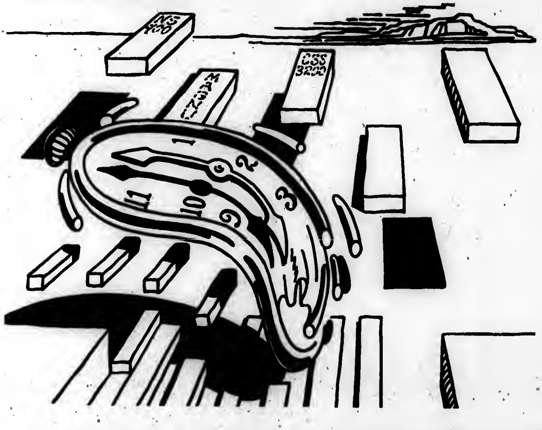

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Panel on Document Dispersal:

End-User Role Vital in Office System Plans

By Marguerite Zientara
CW Staff

ANAHEIM, Calif. — The solution to inefficiency in office automation lies in integrating word processing and message switching systems, and successful implementation depends on end-user involvement at the planning stages.

These were conclusions reached by a panel of experts at a National Computer Conference session here recently on computer-based document distribution.

Document distribution, defined as a subset of electronic mail, can include voice, facsimile or computer-based systems, according to session chairman Gwen C. Edwards, assistant director for policy development at Bell Canada.

According to a Bell Canada survey of 200 institutions — 40% of which were government agencies, 30% industry and 30% research organizations — personnel resented computer-based document distribution systems if they were not involved with them from the beginning, Edwards said.

People with positive perceptions of such systems used them more, and the more they used them, the more positive their perceptions became, she said.

Twenty-two percent of users surveyed developed more negative attitudes over a period of one year, and the reason was overwhelmingly access problems, the survey showed. Most users however, experienced positive changes in their perceptions, Edwards said.

According to the survey, people will not tolerate problems associated with access and response time, Edwards said. In addition, it is essential to them to be able to retrieve messages sent, which the survey indicated they did an average of 15 times per week. In this area, electronic message systems are superior to the traditional TWX and Telex systems, which generate "cumbersome" hard copy, Edwards said.

Army Case Study

A case study of one organization's electronic mail system revealed both positive and negative effects on personnel. The U.S. Army's Development and Readiness Command (Darcom) in Alexandria, Va., uses a Texas Instruments, Inc. Silent 745 portable terminal to hook up with the Arpanet network for frequent transmission of "very complex documents," according to John Gilbert, Darcom's director of management information systems (MIS).

He was enthusiastic about the system, noting it has text-editing, filing, searching and spelling-correction capabilities.

Gilbert said Darcom began using the system in November 1974 as an experiment with no particular objective, "just to see if our business operations changed in any way in the course of a year." By December of the same year, Gilbert said, "I was hooked." Within six months, substantial effects were being felt.

First of all, the system became a substitute for phone calls, Gilbert said, noting that it eliminated interrupting other people and also eliminated the "missed phone call" syndrome.

In addition, his travel patterns changed. He used to visit associated offices about once a month, but with the electronic mail system he now goes six months at a time without visiting, he said.

Gilbert also mentioned that he can now communicate with large numbers of people on the same matter simultaneously by entering an address list into the system for forwarding the message to the desired people. "This results in a broader base of information for everyone involved," he said.

He pointed out that when he logs into the terminal for receiving his mail, he is psychologically in a more receptive frame of mind and is ready to get the most information input.

By the summer of 1975, nine months after its installation, the system's use began to spread, Gilbert said, as others became aware of it. It is now being used by a number of other Army communities, such as the International Logistics Committee, Test and Evaluation Command, the Arctic Test Center and the Tropic Test Center, Gilbert said. The system has overcome time zone lags and speeds up communications "tremendously," he said.

Some Problems

The system has presented a few problems, according to Gilbert. First, message-switching and text-editing functions are not well integrated, resulting in "irritating confusion" for the user of the terminal, he said. In addition, access problems, or "busy signals," also annoy users.

Further, managers are reluctant to touch terminals because they view them as "demeaning." Gilbert suggested this problem could only be solved by "dying off this generation of managers."

A way of monitoring the quality of service should be developed, he added. Gilbert also advised MIS managers to "learn to type."

Another case study of the use of electronic message switching — this time by Hotline International (HI), a nonprofit service organization based in New York — illustrated document distribution worldwide.

For the past four years, HI has worked with United Nations consultants around the world using document-distribution and message-switching technology to extend participation in pertinent conferences and to help political figures make informed, intelligent decisions on timely issues, such as the environment, according to Glen Leet, director, and Mildred Robbins Leet, codirector of the firm.

Thirteen colleges and universities and 100 national and international nongovernmental organizations are involved in HI. The service organization's activities are focused in 10 U.S. cities and in London, Paris, Montreal, Toronto and Vancouver.

The first conference hookup was between Nairobi, Kenya, and the U.S. in 1974. The Leetses used a TI Silent 700 terminal transmitting over telephone lines to an IBM 370/168 in the U.S. Once they got the Nairobi telephone operators to understand that a tone, not a voice, would be transmitted over the wires, they had no problems, they said. Government cooperation was no problem either, they said, because "Kenya was extremely proud to have direct communications with the U.S."

They noted that with electronic communication, the input is often "less emotional, more precise and more concise." Concerning the U.N., the Leetses said the system reduces costs and improves the quality of decisions made.

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Whitman College Sharing Admissions Software

By Ann Dooley
CW Staff

WALLA WALLA, Wash. — Whitman College here is sharing its admissions software with Seattle University's admissions office so both schools will have a more efficient student tracking program.

The software system, developed by Whitman College last fall, tracks a prospective student from his first contact with the school through the entire admissions process, according to R.R. Thomassen, director of the school's computer center.

Each of the schools use a Hewlett-Packard Co. 3000 Series II Model 8 system. When Seattle University administrators heard about Whitman's admissions package, they approached Whitman officials for help.

"We were pleased Seattle University felt free to ask for help. Such cooperation is all too rare among schools in higher education," Whitman President Robert Skotheim said.

Whitman decided to give the admissions program package to Seattle University as a gift because both colleges' requirements are very similar. "Seattle University needed a program such as this, but was not really equipped to develop one for itself. Our program was readily adaptable to its needs and we decided to share our system," systems analyst Wayne Holt said.

Holt worked with Seattle University admissions personnel in installing the software. The system consists of 50 files and 32 programs; all of them were used, since Seattle's admissions program is very similar to Whitman's.

The program was modified only slightly by Seattle University. The changes were few and amounted mainly to changes in wording, Holt said.

"Essentially, Holt brought a tape over and loaded it up in two days," Mike Fox, Seattle University's program director, recalled. The initial phase went very smoothly and there have been only about 20 hours of revisions spread out over the six weeks since the program began operating, he said.

If there are any problems, Holt "comes over and irons them out," Fox said.

Seattle University still hasn't received the documentation, which is being done more slowly than the installation phase, Fox said. But since there haven't been any bugs, it's been no problem, he added.

When the system was installed, Holt and the Seattle University admissions staff ran all the programs to make sure they were operating properly and then printed them up as a final check. The process required a lot of cooperation between the user and the computer center, Fox noted.

"We're very pleased with the program and Whitman's cooperation in working with us," according to Mike Lyons, director of Seattle University's high school/college relations. Seattle University's old method of keypunching the information took much longer and was not as easily accessible, he said.

Student Tracking

In developing the initial system, admissions officials at Whitman knew what they wanted and worked closely with the computer center to get it, Thomassen said. The system was designed so that when the admissions office gets an inquiry from a prospective student, the student is assigned an identification number.

The student's name and address as well as details about his interests are entered into the system's data base via CRTs. Additional information is entered as the student makes further inquiries or applies for admission.

The system prints a mailing label for all correspondence with the student, Thomassen said.

Information such as high school grades, entrance test scores, ethnic background, how the student found out about the school and outside interests is entered into the system.

In addition to its use in tracking prospective students through the admissions process, the data base is accessed for statistical analysis reports, according to Thomassen. Any common group of students can be extracted from the data base for special purposes, such as when the football coach wants to know which entering students had experience in the game.

A student's privacy is protected because users must know the right password before getting into the system, Thomassen said. A daily audit trail is run to determine who used which files and for what purposes.

Other schools have expressed interest in Whitman College's admissions program package, but difficulties arise when working with non-HP equipment, Thomassen said.

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IBM Leasing: How to Optimize Your Cash Flow

By Marcia L. Geyer

IN DEPTH
IN DEPTH
IN DEPTH

Financial advantages are buried in the text of IBM's new Lease Rental Agreement (LRA), compared with earlier IBM leases, that data processing managers can use to their companies' benefit.

The most notable improvements are:

- Lower termination charges, especially in the last six months of the lease.
- Some no-charge conditions for early termination of features and, in some customers' LRA Supplements, a documentation deficiency that lists features as not subject to termination charges at all.
- Purchase price protection and documentation of purchase credit accruals during the life of the lease.

But there are a couple of points of which users should be aware. One is the need to give 30 days' written notice when discontinuing or downgrading a machine at the end of a lease term. The other is the "Upper Limit Percent" box, which some day will mark the end of price protection for the monthly lease charge during the term of the lease.

Differences in Plans

The differences between the older types of IBM leasing plans and the LRA are not in monthly lease payments. Monthly payments for, say, a two-year lease of a Model 3350 disk unit will be the same under the LRA, Fixed Term Plan (FTP) and Extended Term Plan (ETP) agreements. The monthly lease payment comes from the IBM sales manual.

But the default billing action (if you neglect to cancel or renew the lease for a piece of equipment at its expiration); the early termination charge if you cancel early or require a factory modification of the machine; the price protection of the monthly lease payment and of the purchase price; and the applicability of termination charges to optional features — all of these are handled differently in the LRA than in the previous leases.

A DP user's changes of plans that cause early termination are given better treatment under the LRA than under the earlier lease plans in almost all cases. The few exceptions will be noted later, and we will examine the impact of termination schedules in depth.

Customer Financial Management

The LRA lease may have been written by IBM with the intention of fostering better customer financial planning and lease management. Certainly that effect is promoted in a conversion to the LRA lease because all the leases which have been executed over the past years are gathered into one bundle of LRA Supplements (the individual pages executed for each equipment type).

The purchase-price ceiling during the term of a lease under the LRA may only reflect the current reality. that IBM purchase prices will, if changed, go down rather than up. Or the ceiling may be a swap for the new IBM option to increase monthly lease charges during the term of the lease, subject to a maximum percent increase per year.

In any case, because the maximum purchase price — the current purchase price at the time the Supplement is executed — and the rate of accrual of purchase-option credits are documented in the LRA Supplement, the alert DP manager can, for the first time, calculate exactly when exercising the purchase option will be most advantageous and can budget this move well in advance.

There is a fascinating little box on the LRA Supplement marked "Upper Limit Percent." It stipulates the amount that lease payments may be annually increased during a lease.

The practical significance of this new IBM option was not evident in my research of pricing for a number of machines because in each case the Upper Limit Percent was zero, indicating no increase.

My best guess is that the option will be applied after previous forms of leases have been totally withdrawn from use, perhaps when a future generation of equipment is introduced.

Discontinuing Features

The terms for discontinuing features attached to leased machines are clearly better under the LRA than under previous leases. Under the FTP and ETP agreements, the monthly lease charge for a machine and the features installed with it are listed as a single amount on one line. The termination charge is a certain number of months multiplied by this amount.

On the LRA Supplement, however, there is a separate line for each model or feature number that lists, among other things, the monthly lease charge and the termination values. There are several conditions under which early termination of a feature leased under the LRA does not subject the customer to any early termination charge at all.

Unfortunately, policy in this area is not as clearly documented as the other LRA financial variables. One installation's LRA Supplements list the early termination charge for each of its features as "N/A," or no applicable charge. Its IBM support staff, however, informed it of a list of conditions under which termination charges would not apply, implying that in other cases there would be termination charges.

Since the no-charge categories for features are not listed anywhere in the LRA or its Supplements, and this installation's contracts say "N/A" for each feature's termination charges, the site will have excellent grounds for a billing argument later on if it discontinues a feature in a manner that does not happen to fall under the "no-charge" categories quoted to it and if IBM attempts to bill it for early termination of a feature. Perhaps you, too, will be equally fortunate until such time as IBM documents its policy within the contract itself in a clear and unambiguous manner.

Early Terminations

After establishing the suitability of a new type of equipment within one's hardware/software configuration, the best reason for not signing a two-year lease is the expense of changing plans if new gear with an improved price/performance ratio becomes available or if any number of conditions change within the organization, leading to a change of configuration.

In the real world of DP management, a clear vision of the next 24 months' equipment needs, as perceived by one's senior management and users, may indicate miraculous powers of clairvoyance in addition to normal business acumen.

However, there is good news: the LRA treats customer changes of plans in the later months of the lease considerably less harshly than previous IBM leases. The incentives for leasing have been increased because the difference

(Continued on Page 20)

EARLY TERMINATION CHARGES
AS NUMBER OF MONTHS' LEASE PAYMENTS
FOR TWO-YEAR IBM LEASES

Month of Lease	Type of Lease		
	LRA	FTP	ETP
1	5.00	5.00	5.00
2	5.00	5.00	5.00
3	5.00	5.00	5.00
4	5.00	5.00	5.00
5	5.00	5.00	5.00
6	4.75	5.00	5.00
7	4.50	5.00	4.00
8	4.25	5.00	4.00
9	4.00	5.00	4.00
10	3.75	5.00	4.00
11	3.50	5.00	4.00
12	3.25	5.00	4.00
13	3.00	2.50	3.00
14	2.75	2.50	3.00
15	2.50	2.50	3.00
16	2.25	2.50	3.00
17	2.00	2.50	3.00
18	1.75	2.50	3.00
19	1.50	2.50	2.00
20	1.25	2.50	2.00
21	1.00	2.50	2.00
22	.75	2.50	2.00
23	.50	2.00	2.00
24	.25	1.00	1.00

Figure 1

(Continued from Page 19)

between the lower lease rate and the early termination payment is likely, under the LRA, to be in the customer's favor.

Basis of Comparison

It took considerable digging to discover the superiority of the LRA early termination charges. The problem was translating early termination charges into commensurate terms among the leases by using a unit of measure that can be compared at each month in the life of the lease.

The FTP and ETP formulas for early termination charges are quite straightforward. For example, early discontinuance during the second six-month period of a two-year ETP lease entails four months' lease payments.

Like the other financial terms, the early termination charge of the LRA is a variable filled in on the individual Supplement. To further complicate matters, the charge is the lesser of two amounts, either "x" percent of the total remaining contract value or "y" months' payments.

In all the cases I have examined, the value of "x" is 25% of remaining contract value, and the value of "y" is five months' lease payments. So I didn't need a computer to translate the remaining value of the contract into a specific number of monthly lease payments at each month of the lease.

Figure 1 shows the termination values for each of the three leases, expressed as number of monthly lease payments. I would caution contract administrators to check the column on the far right of the LRA Supplement for the numbers "25/5."

If the first number is not 25, the remaining contract value for that machine must be recalculated, working back in time from the last month to the month when the percent of remaining contract value is greater than or equal to the number of monthly payments listed as the second termination value on the Supplement.

As Figure 1 shows, early termination charges under all three lease plans are five months' lease payments if termination occurs during the first five months of the lease. Thereafter, LRA early termination charges are lower than those of FTP except in months 13 and 14 and lower than those of ETP except in months 7, 8 and 9.

Usually, then, early termination costs less under the LRA than under previous forms of leasing. This is always the case after the 14th month of a 24-month lease.

It should be noted that the values listed under months 13 through 24 of the LRA are the termination values, i.e. 25% of remaining contract value, in months 1 through 12 of an LRA one-year extension. But the amount of the monthly lease payment by which these values are multiplied is higher for a one-year term than for a two-year term.

Conversion Loophole

The pattern of early termination charges revealed above is of practical significance if your installation is currently leasing gear under the FTP or ETP that you would like to discontinue. You may profit by converting the gear to LRA before giving notice of early termination, even if the LRA conversion delays your notice by one additional billing cycle.

Particularly in the final two months of a lease, the LRA assessment of 25% of the remaining value of the contract stands out in favorable contrast to the ETP and FTP assessments of the whole remaining contract value as the early termination charge.

If there are any optional features attached to a leased machine, there may be further improvement through the omission of their lease payments from the amount of the monthly payment which is multiplied by remaining contract value to obtain the early termination charge.

If the features are listed on the Supplement as having a termination value, you can still check with IBM for a list of no-charge conditions that apply to them. You will probably find a condition which you can use in your particular sequence of removing or reconfiguring machines.

Expiration Options, Defaults

At the expiration of any of the leases, your choices are as follows: execution of an LRA Supplement for the full term; a one-year LRA extension if the machine has previously been converted to LRA; a one-time less than one-year LRA Extension; monthly rental; discontinuance; or downgrading of the machine.

If the customer does not notify IBM that he wishes to take any of these actions, the default action at termination of an FTP or ETP lease is transfer to monthly rental at the premium Monthly Availability Charge (MAC) rate. Failure to convert from earlier forms of leasing to the LRA as leases expire and are withdrawn also results in reversion to MAC.

If the customer fails to take any action at the expiration of an LRA, the LRA default action is an automatic one-time, one-year extension, followed by transfer to monthly rental under the LRA if there is still no notice from the customer.

In the absence of any information, the LRA default to a one-year extension may well be the most economical way IBM can take care of the customer's interests. But as with any automatic renewal, you don't really want to be taken by surprise.

Execution of a new Supplement for a full term (presumably two years, although this, too, is a variable filled in on the Supplement), extension for a year or less than a year and conversion to rental can all be done as late as the day the LRA expires.

But beware: if you wish to discontinue or downgrade a machine at the expiration of its LRA lease term, you must give 30 days' prior notice. And although IBM is obligated by the terms of the LRA to inform you in advance of the new lease prices, it is not required to bring the expiration to your attention 30 days or more in advance.

To be safe, you may wish to establish a contract administration "tickler" file, alerting you at least 60 days in advance that it is time to obtain prices and to make a decision about the disposition of the leased gear.

Choosing a Renewal Term

If you know of a planned replacement or reconfiguration of your leased machine, it is not too difficult to select the term of renewal. The first likely month of replacement or downgrade or upgrade which is not field-installable should be the last month of your LRA extension, since you can always retain the machine on monthly rental if schedules slip a bit.

But if the future is less certain — if a contemplated replacement may or may not occur in about 18 months, for example — the economics of a one-year extension vs. a two-year new Supplement should be examined as to the total cash outflow for the cases you can foresee. The case study which follows demonstrates a simple method for finding the least costly LRA lease renewal option.

Printer Case Study

Suppose you are considering upgrading from a Model 3211 printer to a 3800 printer subsystem, on order, in December of 1980. But you don't yet know whether you will obtain approval for the additional expense in your annual budget.

If you can't upgrade, you would like to continue to accrue purchase option credits as quickly as possible and will probably convert the 3211 to installment purchase when it is fully accrued.

Futhermore, let us suppose that you have already converted your leased gear to the LRA and that the converted Supplement for the 3211 expires on May 1, 1979. Now you have to decide whether to execute a new two-year Supplement or a one-year extension.

The current monthly lease price quoted you for a 3211/001 is $1,680 on a two-year lease and $1,840 on a one-year lease or less than one-year extension.

Figure 2 shows the accumulated monthly lease payments for a two-year term in Column 1 and the accumulated monthly poayments for two on-year extensions in Column 5. For the purposes of this exercise, the dubious assumption is made that there will be no

CASH FLOWS FOR 3211/001 LRA LEASES

TWO-YEAR SUPPLEMENT				TWO ONE-YEAR EXTENSIONS		
Month of Lease	Aggregated Monthly Lease Payments	Early Termination Charge	Total Cash Outflow at Termination		Aggregated Monthly Lease Payments	Early Termination Charge
Column	(1)	(2)	(3)	(4)	(5)	(6)
1	$1,680	$8,400	$8,400	$5,520	$1,840	$5,520
2	3,360	8,400	10,080	6,900	3,680	5,060
3	5,040	8,400	11,760	8,280	5,520	4,600
4	6,720	8,400	13,440	9,660	7,360	4,140
5	8,400	8,400	15,120	11,040	9,200	3,680
6	10,080	7,980	16,380	12,420	11,040	3,220
7	11,760	7,560	17,640	13,800	12,880	2,760
8	13,440	7,140	18,900	15,180	14,720	2,300
9	15,120	6,720	20,160	16,560	16,560	1,840
10	16,800	6,300	21,420	17,940	18,400	1,380
11	18,480	5,880	22,680	19,320	20,240	920
12	20,160	5,460	23,940	20,700	22,080	460
13	21,840	5,040	25,200	27,600	23,920	5,520
14	23,520	4,620	26,460	28,980	25,760	5,060
15	25,200	4,200	27,720	30,360	27,600	4,600
16	26,880	3,780	28,980	31,740	29,440	4,140
17	28,560	3,360	30,240	33,120	31,280	3,680
18	30,240	2,940	31,500	34,500	33,120	3,220
19	31,920	2,520	32,760	35,880	34,960	2,760
20	33,600	2,100	34,020	37,260	36,800	2,300
21	35,280	1,680	35,280	38,640	38,640	1,840
22	36,960	1,260	36,540	40,020	40,480	1,380
23	38,640	840	37,800	41,400	42,320	920
24	40,320	420	39,060	42,780	44,160	460

Figure 2

increase in lease price at the beginning of the second one-year term, since we cannot know in advance how much it will be.

Early termination charges are shown in columns 2 and 6. The numbers in Column 2 are the product of $1,680 times the LRA values in Figure 1. The numbers in Column 6 are the product of $1,840 times the values in the LRA column of Figure 1 in months 13 through 24 (as explained previously) and are repeated for each year of the lease period under consideration.

Finally, the numbers in columns 3 and 4 are the total cash outflow if the lease is terminated early at the month shown (not including sales tax). The numbers in Column 3 are the sum of the prior month amount from Column 1 — that is, the monthly lease payments to date — and the current month termination payment from Column 2.

The numbers in Column 4 are the sum of the prior month lease payments from Column 5 and the current month termination charge from Column 6.

Comparing columns 3 and 4 in Figure 2, we see the two-year term is less costly if the 3211 is kept for more than 12 months.

Let us assume, however, that you would know at the expiration of the one-year extension what the correct number of months for a less than one-year second extension would be and that you would thereby be able to avoid early termination charges. Comparing columns 3 and 5, we see that the least costly method of leasing for a period of 13 to 15 months is a one-year extension followed by an extension of one, two or three months.

But for a period of 16 to 24 months, the total of monthly lease payments and early termination charges under the new two-year Supplement is less than monthly lease payments alone under two extensions. This is a finding worth considering seriously.

To repeat, for it is surprising, the current discount structure of the 3211, to which we have just applied a cost accumulation procedure, is such that, when combined with the LRA termination charge formula, *it costs less to sign for two years and cancel during the final nine months than to lease for a precise 16- to 23-month period.*

Further, we have obtained this result without considering the present value of money or factoring in a probable increase in the monthly lease payment at the beginning of the second term.

For the circumstances of this case, therefore, you would choose a two-year LRA term as the option which will certainly be least costly, whether you trade in the 3211 for a 3800 after 18 months or keep it for the full term.

The Context of Incentives

Placing the increased financial incentives of the two-year LRA lease in proper context is both a speculative endeavor and an evaluation which each installation's management must make by taking into account the shop's growth pattern, its tendency to stay at the leasing edge of hardware and software technology and the direction of its major application development efforts.

Certainly there is a correlation between the highly visible reductions of purchase price we have witnessed during the past year and the several relatively obscure financial incentives of the LRA, which have been analyzed here.

Many knowledgeable users await the announcement of the next real generation of IBM hardware, viewing recently announced systems like the 370/155 as transitional models. At the same time, acute shortages and horrendous lead times are the rule for many lines of IBM equipment.

A long-term commitment to a tape drive is not equivalent to a long-term commitment to a terminal or teleprocessing controller. The tape drive is not likely to stand in the way of user progress, but a teleprocessing device unsupported by the interactive financial program product desired by a powerful user could become useless in some environments.

Recent price/performance trends might give pause to the larger shop's DP executive when it comes time to renew a lease for a group of 3330 Model 1 disk drives. But in a stable DOS/VS shop which carefully limits its disk requirements, another two-year lease of these disks might be a very sound, economical management decision.

So the advisability of leasing depends upon the particular equipment, both in the context of a particular installation's DP objectives, scale and state-of-the-art inclinations and relative to the particular machine's progress toward obsolescence.

Marcia L. Geyer is president of Geyer Human Information Services, Inc. in New York City. Her firm, which offers DP management consulting services to users and vendors, specializes in the writing, negotiation and administration of contracts, in management planning assistance and in analyses of technical and financial problems and goals.

Geyer began her career in DP at IBM's Systems Development Division in Poughkeepsie, N.Y. She spent several years with American Airlines as a systems programmer and DP training coordinator and with Inco Ltd. in several DP management positions.

Editorial

Communications Bill of '78

No one likes to have his security blanket wrenched away from him with unexpected vigor. But that is what the Communications Act of 1978 would do to many sectors of the common carrier area if it is enacted into law in its present form.

Already there are rumblings that the long, drawn-out rule-making proceedings before the Federal Communications Commission actually have a "stabilizing effect." Others claim that the so-called Section 214 authorizations which explore a carrier's ability to provide service are provisions which must be tolerated.

These statements are motivated hy the uncertainty of what a deregulated industry would spawn. Those previously favoring an AT&T with freedom to compete now ask for guarantees against unfair competition. And the prospect of an independent Western Electric Co. is tempered by the thought that such a vendor, if it chose, would have quite a clout in the medium-scale mainframe area.

in the shorter term, it is puzzling to consider the role of a competitive AT&T affiliate without in-house Western Electric equipment to offer. Even the most effective network suppliers need the latest equipment to get the full benefit from their service. Would a phone company without a manufacturing affiliate have to bargain on the outside for its equipment like everyone else?

The key element remains whether Bell can be persuaded that entry into DP is worth casting off Western Electric. Up until now, the phone company has introduced terminals, such as the Dataspeed 40/4, that operate with DP-type functions, and it has offered Transaction Network Service as a possible forerunner of more extensive services tailored to DP users.

With its features encroaching more and more into the DP area, Bell is much safer under the protective umbrella of regulation. AT&T has never said it favors full competition in nonregulated areas for itself. Perhaps it considers that too much of a business risk, even for a separate affiliate.

The features of the communications act concerning competition are obviously aimed at Bell. It remains to be seen how the phone company will react. More important, if members of Congress see this as legislation that threatens their communications carrier supporters, including Bell and the unions, the bill may never get passed, regardless of its merits.

Hearings scheduled to start in July will help determine whether this bill can reshape an area bogged down in regulations into a streamlined industry full of innovation and alternatives that allow users to get the business communications they need.

Application That Hits Home

Of the hundreds of applications one can read about in Computer*world* every year, few have such a direct, positive impact on the little man as the recenty implemented computer system in New York City's housing courts [CW, June 19].

In recent years, tenants have threatened to withhold payment of rent and in fact have withheld those payments as a weapon of last resort when necessary repairs have not been made on their apartments, This action has landed many tenants in court as defendants in suits charging nonpayment.

it is difficult for the tenant under such circumstances to gather much evidence against the landlord except for the few items in dispute within the tenant's own apartment.

Now, however, with the computer terminal right at the bench, the housing court judge hearing a case can access a data base of information maintained by the city on each landlord and his buildings, including such data as the number of complaints against his properties, the number of code violations uncovered by city inspectors and whether the landlord is up-to-date in his tax payments. The judge can determine pretty quickly what kind of landlord he has before him and whether the tenant has a legitimate reason for withholding rent payments.

Under consideration is a very useful by-product of the system — a plan to sell computer printouts of the housing data to make public information on the buildings in the city and to encourage potential litigants to act.

This could go a long way toward making landlords live up to their end of lease agreements, providing better living conditions.

Data Past

Five Years Ago
June 27, 1973

NEW YORK — In one of its strongest moves to date, the Justice Department asked Judge David N. Edelstein to impose stiff civil and criminal penalties against IBM if it continued to refuse to turn over documents to the government for its antitrust action.

Eight Years Ago
July 1, 1970

WASHINGTON, D.C. — An investigation by the National Bureau of Standards found that the noise levels in computer centers were frequently of sufficient magnitude to cause permanent hearing damage in addition to "relatively simple errors by programmers."

'Guess What — This One's Empty, Too!'

Letters to the Editor

'Congratulations, Wisconsin'

Concerning "Wisconsin Kills 4% Sales Tax on DP Services" [CW, June 12], congratulations to all data processors in Wisconsin, especially to the members of Cute and specifically Glenn Jacobson.

The repeal of the unfair tax is another link in the chain that our industry is forging to solidify our stand throughout the country on this issue. As national coordinator for the Data Processing Management Association's (DPMA) Sales Tax Subcommittee, I am most encouraged by the "grassroots" effort (as exemplified in the Wisconsin case).

With recent victories in at least six states, we are an active force that state legislators and taxing authorities now respect.

Steve Vajda
Miami, Fla.

DP Studies at Southwest Texas

The computer scientists of the Department of Mathematics at Southwest Texas State University are concerned that Computer*world* readers may form an inaccurate and negative impression concerning the philosophy and structure of computer science studies on our campus ["DP Graduates Lack Business Savvy: Survey," CW, May 8, and "A Sad State of Confusion," CW, May 22].

The Department of Mathematics offers a B.S. degree in computer science which is modeled after the Association for Computing Machinery's Curriculum '68. We also offer a teaching field in computer science, a graduate [M.A./M.S.] minor, and hope soon to offer the M.S. and M.A. degrees in computer science.

The Department of Accounting and Computer Science offers a bachelor's in business administration with a concentration in computer science and a bachelor's degree in management information systems.

Grady Early
S. Gene Crossley
Southwest Texas State University
San Marcos, Texas

Federal Government and DP

The front-page article "Government Treating DPers Ineptly" [CW, June 5] mentioned, in passing, the "noncompetitive [government] salaries for [both] entry-level programmers and highly technical jobs . . . " All too often, such statements go unchallenged and are accepted as fact by an uninformed public.

Our firm specializes in recruiting computer professionals. During the last 10 years, our Washington, D.C., area office has been extensively, and exclusively, involved with the local employment marketplace. Based on our observations, the federal government has consistently been more than competitive at all computer industry hiring levels except top management. The entrenchment of present management is the source of that problem.

David Samuelson
Quest Systems, Inc.
Washington, D.C.

Preventing Privacy Abuses

Matching welfare rolls, tax rolls and payrolls should not pit efficiency against privacy. Corporations and tax agencies, which lend their files to welfare agencies, should first delete personal details.

The loan of a bare list of numbers, names and addresses of taxpayers or employees whose income exceeds welfare eligibility would prevent abuse.

Richard H. Shulman
Bronx, N.Y.

The Human Connection

Listening Skills Key to Understanding Users

**By Jack Stone
And Ida Mason**
Special to CW

Yet another of the bewildering contradictions within our bizarre business is the use of ambiguous communications between the user and the analyst as the basis for systems design and programming. While everybody agrees that information systems development is an area in which there is no room for communications ambiguity, how often have you completed a conversation with one of your compatriots about a technical matter and felt you weren't really sure you made your point or you weren't completely certain you understood the other person's position?

We submit that what's lacking in the user/analyst dialogue is the capability for each of the parties to listen.

You see, most people have relatively little difficulty speaking to others since there is some measure of ego-display involved. But to listen, and listen closely enough to derive meaning and understanding, requires a temporary restraint on one's ego forces, and many are reluctant to exercise that restraint.

Ida Mason recently attended an informative seminar on business communications presented by Barbara Gennett of the Deerborne School of Coral Gables, Fla. Gennett's views include some interesting and practical insights which may have value to the information system community. Here is Ida Mason's report on the seminar highlights:

In today's world, it is the spoken word, not the written word, which is the most influential medium of communication. In less than 100 years, we have progressed from Alexander Bell's primitive telephone to worldwide satellite communication systems that transmit telephone conversations, television pictures and digital data instantly between continents. Yet with all these communications facilities available to us, it is ironic that, on occasion, little information content is actually transported.

This may be the age of electronic communications services, but it is also the age of serious gaps in understanding. There are well-known and critical gaps between parents and children, between governments and governed, between nations and between races. Despite the many aids to human communications, we too often fail to convey our ideas to others or get their ideas from them.

Communications Snags

Let's briefly examine some of the problems that we encounter in oral communications.

Most people pay only "selective attention" to what they hear, in that they listen most closely to ideas with which they already agree.

It should be no surprise that people are not open to all points of view. Democrats listen to Democratic speakers. Businessmen listen to the businessman's point of view.

When we encounter ideas we don't like, we sometimes reinterpret them to make them conform with our own notions. We humans also show a greater ability to remember material that agrees with our position and forget material that opposes it.

Other difficulties arise when spoken words call up the wrong images in the listener's mind. Obviously, the meaning of words depends on both familiarity and the feelings that are aroused. For example, the word "citation" could mean either merit or traffic ticket, depending on our past experiences.

Then there are the confusion factors sent via nonverbal communications, gestures and facial expressions. Unintended meaning may be conveyed from a listener's smile or frown or seemingly indifferent stare. Or a speaker may say he is requesting something when his expression and posture suggest he is really demanding it.

We should realize that in all phases of our life — at business, in the home, during recreation periods — our experiences are vastly different. For successful communications, we must listen carefully. We must be very tolerant and patient in trying to understand the viewpoints, and ideas of others.

We must nurture curiosity. We must want to discover and learn from the experiences of others. Although it is rare to find a speaker with the final truth, it is just as rare to find a person who doesn't have something significant to say.

John Culkin's comment certainly applies to all walks of life: "Communication consists not in saying things but in having them heard."

Letters to Stone should be addressed to him at Suite 222, 2233 Wisconsin Ave. N.W., Washington, D.C. 20007.

The Taylor Report

'Claims-Made' Insurance Covers DP Malpractice

By Alan Taylor
Special to CW

I recently commented about the DP errors and omissions policy of one of the major insurance companies [CW, June 12]. Now I have received a copy of a very different policy — a real malpractice policy for DPers.

Tully of America, Inc., headquartered in Indianapolis, Ind., tells me it has just started issuing the policy, having recently gotten backing from some of Lloyd's of London's underwriters. The firm's background is in malpractice in general, rather than in DP.

It's worth commenting on the policy's provisions.

'Claims-Made' Coverage

There are two types of basic malpractice insurance, the "occurrence" type and the "claims-made" type. Under the first type, coverage is generally provided for any act or omission that occurs during the policy period, regardless of when the claim is made. By contrast, the "claims-made" type offered by Tully covers the claim regardless of when the problem occurred.

Naturally, there is a requirement that denies coverage for prior acts if they are known and concealed at the time the policy was issued.

There seems to be a question as to the validity of the claims-made policy in view of certain public policy considerations. The California insurance code asks for a prominent notice on the front page of claims-made policies bringing this question to the user's notice.

Claims-made policies usually cover something that has occurred, but for which a formal claim has not been made during the period. The method used to keep coverage going is for the professional concerned — doctor, lawyer or DPer — to give written notice of the occurrence of possible future claims before the policy's expiration.

The insured usually furnishes the insurance company with a list of every act and omission he reasonably considers may some day result in a claim and, of course, he keeps a copy of the list.

In fact, in deciding between policies it is particularly important to look at the termination situations, particularly why a company may unilaterally cancel or refuse to renew a malpractice policy. Usually the insured has the right, for some additional premium (such as 10% of the annual fee) to secure a limited extention of the coverage so that new coverage can be obtained.

The second major provision, coverage for errors and omis-

(Continued on Page 24)

Reader Commentary

Reader Explains Routine For Finding Julian Hours

By Richard Sternbergh
Special to CW

I recently developed a new Julian hour routine for use on the IBM 360 at my place of employment. Recalling a series of letters to the editor in Computerworld on this subject, I thought I'd share it.

It is based on the fact that there are approximately 365.25 days per year. The extra quarter days are incremented every four years. Therefore, the number of days between the beginning of this century and the beginning of any year is given by:

```
(Year is two digit year)
DAYS=YEAR*365.25
```

This result should be truncated to a whole integer.

The number of days since the beginning of the year until the end of the the previous month is best found in a table lookup, since the lengths of the months do not follow a mathematical pattern. Each element of the table is the sum of previous element and the days in the previous month; for example, 0,31,59 and so on. The number of days until the end of the last month would be:

```
DAYS=DAYS+TABLE(MONTH)
(Days from previous computation)
(Month is current month)
```

Adding yesterday's date (TODAY-1) yields the number of days since 1900. Multiplying by 24 and adding the hour (on a 24-hour clock, 0-23) gives the final result, the number of hours since the base data/time of Jan. 1, 1900, 00 local time.

```
DAYS=(DAYS+TABLE(MONTH)
+TODAY-1) * 24+HOUR
```

The only exception occurs when the date is itself in a leap year. The algorithm places the extra day between December and January, while the calendar makers placed it between February and March.

Therefore, we have to "postpone" its "addition" until after

(Continued on Page 24)

```
FUNCTION JULHR (YR, MO, DA, HR)
IMPLICIT INTEGER (A-Z)
DIMENSION MODAYS (12)
DATA MODAYS/0, 31, 59, 90, 120, 151, 181, 212,
243, 273, 304, 334/
JULHR=IFIX (YR*365.25)
JULHR=(JULHR+MODAYS (MO) + DA-1) *24+HR
IF (MOD (YR,4) .EQ.O.AND.MO.LE.2) JULHR=JULHR-24
RETURN
END
```

Julian Date Algorithm

Policy Aimed at DP Malpractice Protection

(Continued from Page 23)

sions against legal defense costs and damages, is fairly standard. However, the policy doesn't directly state what will happen if a malicious employee, who is reasonably supervised by the professional, actually causes the problem.

The policy's limits of $100,000 to $500,000 are probably reasonable at this time. The type of error a computer specialist can make can easily cause $100,000 worth of damage.

The upper limit of $500,000 might certainly be too low for a realistic situation, but it is a lot better than nothing.

Until experience has determined the extent of DPers' malpractice exposure and how it can be controlled, it is reasonable to expect somewhat lower limits than those for other types of insurance for which the limits have been set by many years of experience.

The deductible is also a fairly standard amount. I'm not too happy about Tully's limits of $2,500 to $5,000. When the situation of a single programmer is compared with that of a software house, one or the other of these is too low or too high.

There obviously has to be a deductible, but a range of $1,000 to $10,000 would give a better feel for the real situation.

Potential Buyers

The most interesting part of the whole operation is speculating on who will want such a policy. The Tully malpractice policy can be bought by software houses as well as by systems analysts, programmers and people who run service bureaus.

In each and every situation, this coverage will greatly improve the contractual situation of a person in modern-day business. More and more analysts and programmers are providing services as individuals, either directly to a client or by subcontracting. And more software houses are emerging as the real centers of activity, with the hardware selection being so rich that any of a number of mainframes is suitable. That good software should be able to move from one mainframe to another while still retaining maximum efficiency.

Service bureaus or people providing services for others are also coming into their own as a result of networking and other communication methods. All these outfits have not been able to offer any really substantial coverage to their clients. Normally they have, in fact, used the overly severe contractual restrictions that originated with the 1960 contracts for hardware. Few of them even offer the $100,000 maximum liability restricted coverage available from IBM.

Now these enterprises can beat IBM and show a competitive advantage by offering equal or better coverage limits — through an insurance policy backed by Lloyd's of London.

From a marketing point of view as well as from a professional point of view, I see malpractice policies assisting in providing the surety that people need before they will give their contracts out to software houses, systems analysts, programmers or processors. And, with these premiums, there are many outfits that could take the whole cost — $300 to $2,500 — in their stride.

How this particular policy will work out is anybody's guess. It will be interesting to visit with Tully in 18 months to two years and to keep a watch for other policies being offered in this area. You can keep track by reviewing the "Agent and Buyer's Guide," which your local independent insurance agent can get for you.

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Reader Details Julian Routine

(Continued from Page 23)

February.

The code shown on Page 23 would implement the algorithm in IBM 360 Fortran IV.

The IFIX is used to indicate the truncation and storage of the REAL result into the INTEGER JULHR. This is not necessary as this compiler does that when attempting to store REAL into INTEGER. To emulate the MOD function in Cobol, divide YR by 4 with the REMAINDER option and test if the remainder is 0.

The function, as written is valid until midnight, Dec. 31, 1999; using a 4-digit year minus 1900 will increase its life to the year 2099.

Since centuries are leap years only when divisible evenly by 400, any further extension requires another decision, eliminating the leap day in the years 2100, 2200, 2300, 2500 and so on. Since this won't be needed for 122 years, the overhead was deemed unnecessary.

Regarding storage requirements, all variables could be halfwords (or two to three decimal digits minimally) except for JULHR, which requires a fullword or seven decimal digits (the end of 2099 is 1738847 Julian hours).

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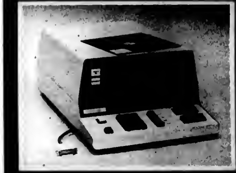

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- Powerful text editing capabilities

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[illegible]
[illegible]
[illegible]

Another UK Offering

CIS Cobol Extensions Aid Small Sites

LONDON — The Compact Interactive Standard (CIS) Cobol compiler now available from Micro Focus Ltd. for use on Intel 8080 and other microcomputers and small business systems was described as a subset of the ANS Cobol 74 specifications with extensions particularly useful for interactive DP.

The enhancements provide for interactive working, program control of files, text file handling, rapid development and testing, a spokesman explained.

These facilities permit the programmer to specify everything for the application from one place, the Cobol program itself. For example, the spokesman said, all operational control is inside the program; there is no need for external job control definition or screen definition.

In particular, CIS Cobol provides advanced screen formatting and data entry facilities, runtime input of file names, line sequential files and hexadecimal literals, he noted. Upper and lower case printouts are also possible, providing easy reading of reports, he continued.

During development, compiled programs can be loaded directly by the runtime system "fast load" facility, avoiding time otherwise spent in linking. The compiler is said to accept its own list file as source code so the user can develop programs quickly and easily from the CRT.

Interactive debugging is said to permit the setting of breakpoints, along with the examination and modification of memory locations as those points are reached during execution. Each Cobol statement is identified by a four-digit hexadecimal number, the spokesman noted.

The single-pass compiler is available in two forms, as a single monolithic program suitable for residence in read-only memory (ROM) or as an overlaid program, suitable for a disk-based system but taking a minimal amount of memory. The overlaid version consists of a base module and three overlay modules which are loaded successively during compilation, he said.

End users can acquire the overlaid version, distributed on a floppy disk, for $500. A range of supporting programs, including a sort and the ROM-based compiler, are available at additional cost.

Micro Focus is interested in establishing U.S. distributorships, the spokesman added from 18 Vernon Yard, Portobello Road, London W11 2DX, England.

Meeting This Week to Show Broad View of Productivity

ARLINGTON, Va. — The Second Annual Conference on Computer Systems Productivity, to be held at the Ramada Inn Rosslyn here Wednesday, Thursday and Friday of this week, will focus on both people and machine factors, according to general chairman Kendall E. Burroughs of the U.S. Chamber of Commerce.

The keynoting chores, for example, will be shared by Arthur Kirsch, vice-president of Citibank, who will discuss "Integrating Computer Systems Into the Organization," and *Computerworld* columnist Jack Stone talking about "Enhancing Productivity Through the Human Connection."

Structured Analysis

Wednesday morning will end with a session on structured analysis chaired by Dr. Thomas E. Kirchgessner of the University of Southern California and a luncheon talk by John C. Collins of General Scientific, Gaithersburg, Md.

The first afternoon will include two concurrent panel discussions, one focusing on distributed systems made up of minicomputers and microcomputers, the other on "Efficiency in Data Center Management." Thursday morning will follow the same pattern, with sessions on simulation to increase productivity and computer performance measurement.

Albert Eisenstat, vice-president of Tymshare, will speak on time-sharing in the 1980s at Thursday's luncheon, and a trio of concurrent sessions will fill in the afternoon. Subjects to be covered will be "Security and Privacy in Information Systems," "Managing Human Resources" and "Auditing the Computing Function."

'Update for Professionals'

Friday morning will start with three addresses under the general title "Update for Professionals" and end with two more under the umbrella "Waves of the Future."

The update sessions will include Assistant Prof. Donald V. Steward of Virginia Commonwealth University on "Use of the Computer to Define Systems Structure," Richard A. Mackay of the Federal Home Loan Mortgage Corp. on "Development of a Data Processing Steering Committee" and Dr. Donald Fitzpatrick of Arthur Young & Co. on "The Integration of the DP Function With Organizational Goals."

Presented by the Institute for Professional Education, the conference costs $325/person, including lunches and all meeting materials but not hotel accommodations.

The Ramada Inn Rossyln is at 1900 N. Fort Myer Drive, a spokesman noted from the institute's headquarters across the street at 1901 N. Fort Myers Drive.

'Resolve' Update Introduced; MVS Support Downplayed

SUNNYVALE, Calif. — Reversing a trend in many package upgrades, Release 1.3 of the Resolve computer operations support system from Boole & Babbage, Inc. is specifically directed at enhancing its use on non-MVS systems.

The package already included a number of services to help MVS and other IBM OS and OS/VS users eliminate system problems which, unresolved, cause sluggish performance and, in a number of cases, unscheduled "crashes" followed by IPLs, a spokesman said.

Under the lastest release, however, the VS1 user's ability to run Resolve outside a partition was described by the spokesman as a major enhancement. This facility makes it possible to begin using Resolve without disrupting job scheduling or class and partition assignments, he explained.

Another extension provides five functions directed toward the users of IBM's Time Sharing Option (TSO). This service can be used to examine the status of TSO users, their CPU swapping, occupancy time and main storage usage, the spokesman noted.

A "Buffers" function permits the TSO user to evaluate the availability of buffers and their effect on system performance. A "Regions" function displays TSO user queue status and a "Locations" function provides systems programmers with access to the addresses of key TSO control blocks.

The overall TSO support will supplement Resolve's other capabilities and further enhance the user's ability to communicate with the operating system and determine job and system users' status, the spokesman added.

Depending on system and site requirements, Resolve costs $5,000 to $21,000, he said from 510 Oakmead Parkway, Sunnyvale, Calif. 94086.

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Editor Aids DG Users

ROCHESTER, Minn. — An editing system from CRR Associates dubbed Credit enables users working with RDOS-oriented Data General Corp. minicomputers to edit text at a CRT screen more easily than with DG software, CRR claimed.

Credit is said to support full screen — 24 lines of 64 characters each — context editing as well as complete mobility to move through a file forward or backward. Insertion or deletion of individual characters or entire lines is permitted with Credit, the spokesman said.

Lines can be copied from one file to another and between two places in the same file; the editor also supports string search and replace commands, he added.

The user has the ability to alternate editing between two independent files — or different positions in the same file — without losing his current location in either file.

Credit is provided on 9-track, 800 bit/in. magnetic tape in RDOS Dump format, he said, adding that the editor can be licensed for $500.

CRR Associates is at 2120 67th St. N.W., Rochester, Minn. 55901.

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'Secure/IMS' Guards Data From Invalid TP Accesses

SACRAMENTO, Calif. — Described as "maintaining 100% compliance" with the Privacy Protection Study Commission Report of 1977, Secure/-IMS prevents unauthorized access to on-line IMS data bases through the teleprocessing (TP) network, according to its vendor, Software Module Marketing (SMM).

Attempted violations are reported by Secure/IMS within seconds, a spokesman claimed, adding that hard-copy audit reports detail all activity on the system by date, time, operator, terminal and type of work performed.

Operators are given customized menus that allow them to select and work on only those applications for which they are authorized. Operators may move from terminal to terminal, for example, in the event of hardware failure, he added.

Chargeback Billing

At the same time, the optional Transaction Billing System — also available from SMM — interfaces with Secure/-IMS to provide direct chargeback billing for specified cost centers. But billing is done only for those transactions controlled by Secure/IMS, the spokesman emphasized.

While Secure/IMS provides support for operators, auditors and management, it imposes no special burden on programmers. No changes in application program coding is needed to install Secure/IMS, he stated.

The Transaction Billing System utilizes the long-term history file from Secure/IMS and a cost schedule specified by the installation management. Costs are determined for individual transactions (or functions), areas supported by one or more functions and cost centers made up of areas.

Secure/IMS costs $30,000. The Transaction Billing System is available for an additional $10,000, the SMM spokesman said from the Crocker Bank Building Penthouse, 1007 Seventh St., Sacramento, Calif. 95814.

'CAM' Eases Finance Plans

FAIRFIELD, N.J. — A comprehensive Capital Asset Management (CAM) system of interrelated modules is now available through the facilities of Rapidata, Inc., according to a spokeswoman for that remote computing services firm.

Described as a project evaluation and management tool for financial managers, CAM is composed of three major modules: Capital Budgeting and Analysis (Capbud), Capital Project Financial Analysis (CPFA) and Capital Tracking (CPTrac).

Capbud is said to assist users in optimizing capital project returns and in assuring a project mix and risk profile consistent with a corporation's objectives, the spokeswoman said. Project profitability screening and ranking and consolidated, pro forma projections based on user-determined input are key capabilities, she noted.

CPFA assists the analyst in minimizing financing costs. It includes programs for both investment and financing analysis.

CPTrac monitors and forecasts project implementation costs to quickly spot overruns and minimize excess cash reserves, she continued.

The nationwide service is headquartered at 20 New Dutch Lane, Fairfield, N.J. 07006.

SPSS Available On Calldata Net

WOODBURY, N.Y. — The facilities of the Statistical Package for the Social Sciences (SPSS) from SPSS, Inc. are now available as a batch-oriented offering on the Calldata Systems, Inc. remote computing service network.

The package offers users a comprehensive set of procedures for data transformation and file manipulation and a large number of statistical routines commonly used in the social sciences, according to Calldata.

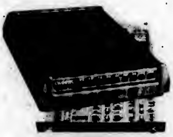
In addition to descriptive statistics, simple frequency distributions and cross-tabulation support, SPSS contains procedures for simple correlation, partial correlation, means for variances for stratified subpopulations and one-way or n-way analysis of variance, the spokesman said.

Multiple Regression

Other facilities are said to include multiple regression, discriminant analysis, scatter diagrams, factor analysis, canonical correlation and Guttman Scaling.

The data management facilities can be used to modify a file of data and can be used in conjunction with any of the statistical procedures, the spokesman added.

While its network facilities are available nationwide, Calldata is based here at 20 Crossways Park North, Woodbury, N.Y. 11797.



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Package Aids Utilities

ANDOVER, Mass. — The unique requirements of utilities and the construction and energy distribution industries can be handled by the IBM 360- and 370-oriented Financial Reporting and Work Order Management System (FR/Woms) now available from Software International, according to a spokesman.

Major areas handled by FR/Woms are work order processing, performance reporting, project tracking and regulatory reporting. Generation of consolidated operating statements and support for budgeting are also highlights of the system, the spokesman noted.

The work order processing reportedly includes support for new construction and maintenance projects, the handling of capitalization and transfer of funds and the recapping of life-to-date information for open work orders.

The performance reporting facilities utilize a data base containing up to 10 years of experience, which can be used for trend monitoring while the project tracking feature highlights projects costing more than user-specified limits.

The spokesman also noted that the system handles Federal Power Commission 100 and 300 series accounting when that is appropriate.

The package costs $47,500 for the DOS version and $52,500 for the OS implementation. Software International is at Elm Sq., Andover, Mass. 01810.

Interdata Users Offered Multifunction Accounting

AUSTIN, Texas — An accounting package said to allow users of Interdata's 16-bit minicomputers to perform a range of functions without program modification, AIS-10, is now available from AIS Data Systems, Inc.

The package includes general ledger, accounts receivable and payable and payroll functions. The logic is tailored to the using installation when its chart of accounts is established, a spokesman noted.

Among the general ledger facilities is support for unlimited subaccounts, multilocation and departmental financial statements and unlimited source journals. Consolidations and closeouts are handled automatically and budgeting, comparative studies and job-costing reports are also part of the system, the spokesman said.

The accounts receivable subsystem can furnish either open item or balance forward statements, in addition to supporting finance charge calculation, statement cycling, group reporting, aging and detailed receivables reporting along with automatic posting of descriptions.

Payroll Subsystem

The payroll subsystem can deal with multiple pay rates; salaried, hourly and mixed earning periods in the same process; input overrides on pay rates or deductions; tax computation based on annualized earnings; and other "special situations," the spokesman claimed.

AIS-10 was designed primarily for small and medium-sized business environments, he said, pointing to support for prior period reporting "after a fiscal year has closed out" as an example of how "user-oriented" and "forgiving" the system is.

The package has been implemented on the Interdata 16-bit minicomputers and is scheduled for adaptation to the Texas Instruments, Inc. 990 environment as well. It is available for $7,500.

AIS can also provide the appropriate hardware for "less than $15,000," the spokesman said from Suite 101, 5511 Parkcrest, Austin, Texas 78731.

Program Tests Print Systems

ANAHEIM, Calif. — A program for testing the quality of virtually any printer that can be attached to an IBM OS or OS/VS system is now available from the Eon Co., according to a spokesman. The program is said to exercise all aspects of a printer's capabilities and clearly show any failure to the user.

No special knowledge is required, nor is any special setup needed; the test routine runs as a regular print job and the printer can be returned to regular production work as soon as the test is over, the spokesman said.

Breakdown Forewarnings

Used on a regular basis, the test routine can indicate when the printer is failing, before the breakdown occurs. It can also be used to compare print quality of different brands and models of printers, he suggested.

If the user is sure the printer itself is working properly, the Eon package can be used to test a communications network, documenting what was received, for example, for comparison with what was sent.

The package costs $190. Eon can be reached through P.O. Box 6375, Anaheim, Calif. 92806.

Correction

The UCC Three-Automatic Direct Access Management (Adam) package from University Computing Co. [CW, May 29] costs $11,000 regardless of the environment in which it is to be used, not the $15,000 originally reported, a UCC spokesman noted from Dallas, Texas.

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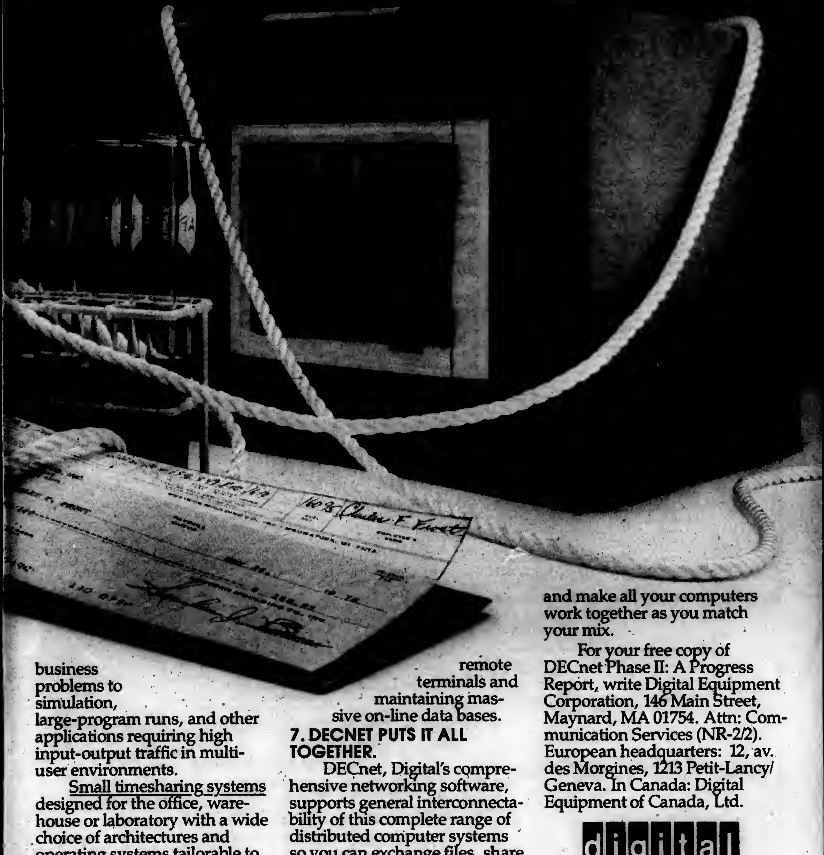

business problems to simulation, large-program runs, and other applications requiring high input-output traffic in multi-user environments.

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CW6268

DBMS Impact Seen Unexpected by Managers

By Brad Schultz
CW Staff

ANAHEIM, Calif. — Management typically does not understand what the long-term impact of a first data base management system (DBMS) will be on its organization when it decides to "go data base." Nor does it usually make this decision on the strength of cost/benefit projections, even in cases where the choice eventually proves justified.

Panelists reached that consensus based on their personal experiences as DBMS users at a recent National Computer Conference session here entitled "Making the Decision to Go Data Base."

The U.S. Forest Service acquired its first DBMS piecemeal in response to diverse and somewhat independent demands for data generated by fluctuations in federal land use policy, according to Jon Kennedy of the government agency.

Chemical Bank of New York's highest officers decided to adopt a system with a leap of faith in its "pleading" DP management, rather than on the basis of cost/benefit analyses, the bank's Frank Korahais indicated. Richard Schubert of B.F. Goodrich Co. remarked this was also true of his firm's DBMS procurement.

Obvious Need

The panelists seemed to agree that a valid long-term cost/benefit projection is nearly impossible to make in evaluating such systems, although it may be obvious when some sort of DBMS is called for in the life of an organization.

For example, Chemical Bank's central DP section found itself besieged by demands for different types of data manipulation. The nation's sixth largest bank with about $30 billion in assets, Chemical needed "grass roots" information for its four principle divisions — corporate finance, international finance, personal services and trust banking — and the DP section began meeting this need with a DBMS structured according to function, Korahais explained.

Resistance Expected

Management should expect some resistance to the incorporation of a new DBMS on the part of some personnel, Schubert warned. Many people cannot conceive of performing their jobs in alternative ways and management may find a "moving around" of employees justified, he explained.

At Goodrich, a number of high-level administrators had to be removed before the firm's new system could be applied smoothly, Schubert recalled.

An important consideration in selecting a DBMS is whether data must be immediately up-to-date, Schubert continued, noting that in some applications, "instantaneous" on-line updating is needed while in other cases a dated memo scheme is adequate.

There is some controversy about the extent to which data must be centralized within a large financial institution, Korahais said, noting that Chemical favors a much more centralized arrangement than does Citibank.

The people who operate a DBMS as system analysts should be able to work well with personnel untrained in computer technology and should recognize and appreciate what expertise other personnel do have, which might often be critical to the success of certain applications, Schubert said.

Student Stress

The session's chairman, Prof. James McKenney of Harvard Business School, remarked that the aspiring data base administrators among his students are often assigned "real world" problems in data base management without any opportunity for feedback from others. These students then learn the frustration of confinement to their own perspectives, McKenney said, and discover that "reality does not come in tidy little boxes."

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Package Eases System/3 On-Line

SANTA ANA, Calif. — Any IBM System/3 Model 8, 10 or 12 can be on-line in a matter of hours while still retaining full batch capabilities with the Super 3 software and controller package now available from Memorex Corp.'s Business Systems Division, according to a spokesman.

The package utilizes a local display controller (LDC) and an information display system (IDS) that allow the System/3 to go on-line in only two steps, file definition and screen format design, he claimed.

Although times may vary with the size of the records and number of fields to be displayed, a typical screen formatting can be done in about 30 minutes, he said, adding that system generation, conversion and recompilations are not necessary.

In operation, Super 3 enables on-line, full security use of the System/3 for file inquiry, file update and data entry while batch processing is performed simultaneously, the spokesman asserted.

In system resources, too, Super 3 outperforms IBM software, the spokesman continued. IBM's Communication Control Program (CCP) requires about 48K of memory, but the Memorex software runs in only 10K to 16K bytes, he said.

The Super 3 package is available for lease or purchase. The lease cost on a three-year plan will be about $125/mo for Memorex's local display adapter (LDA) and $100/mo for the software.

The software can be used with an LCA/3271 and a LDA from IBM, the spokesman added from 3015 Daimler St., Santa Ana, Calif. 92705.

Book Discusses QA Teams in DP

WELLESLEY, Mass.— A methodology for implementing a quality assurance (QA) function in DP organizations is presented in a book just published by Q.E.D. Information Sciences, Inc.

Entitled *Effective Methods of EDP Quality Assurance*, the 340-page publication is said to offer a "how to" approach, bolstered by a sample QA manual.

The book costs $28.50 ($24.50 prepaid) plus $1.50 for postage and handling. It is available from Q.E.D. at P.O. Box 181, 141 Linden St., Wellesley, Mass. 02181.

Finances Run On PDP-11s

SUNNYVALE, Calif. — An on-line financial accounting system for use on Digital Equipment Corp. PDP-11s running under RSTS/E, FS-11 is now available from NCA Corp.

The system is made up of five subsystems integrated so one entry of data is carried through all appropriate operations, according to a spokesman. Currently available subsystems include order entry, sales analysis, accounts receivable, general ledger and accounts payable.

FS-11 costs $15,000 for the first module, $6,000 for each additional one, NCA said from 388 Oakmead Parkway, Sunnyvale, Calif. 94086.

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DBMS Setup Snags Held Usually Nontechnical

By Don Leavitt
CW Staff

ANAHEIM, Calif. — Most of the problems encountered in implementing a data base management system (DBMS) are not really technical, but that often makes them all the harder to solve, according to Hank Herre, manager of technical services or Fibreboard Corp. of San Francisco.

Appearing on a recent National Computer Conference panel here concerned with "Getting Ready for Data Bases," Herre urged anyone going into DBMS to understand, first of all, why a system was selected by their individual organizations.

The setting is quite different, he noted, if the choice was made because the company just wanted to keep up with the Joneses or if the selection was based on a serious evaluation of the system's capabilities.

Once the commitment is made, it has to be sustained, Herre continued. Because a data base system should be a model of the using organization itself, it could cause real strains that only strongly committed people could handle, he said.

In shaping the model, the data base people may well spot inconsistencies in the way the organization works. If that happens, those inconsistencies must be aired, discussed and resolved. Otherwise, the whole exercise is worthless, he warned.

Although he said he couldn't vouch for the absolute dollar amounts, Herre said he feels quite comfortable with the idea that for every dollar spent in implementing a DBMS, a corporation would easily have to spend $100 to back away later, whether bailing out of data base altogether or switching to a different system.

Political Problems

There are — or can be — strong political problems in the initial implementation, Herre cautioned. "Inevitably, someone will raise the question of who owns the data" along with the more serious concerns about who is responsible for maintaining it.

But someone has to make decisions, and they have to be sensible; it isn't necessarily wrong to round figures going into a sales analysis report to the nearest $100, for example, but figures used in accounts receivable and accounts payable "better be a lot more precise than than," he said.

In simple terms, "the best message I can leave with you," Herre concluded, "is to take your time. Time is the one thing that doesn't cost much. Use it, but use it wisely."

Panelist Jim Emerson, now with Peat Marwick Mitchell and Co., recalled his experiences at Norwalk, Conn.-based Burndy Corp., and his message was much the same as Herre's. Start by recognizing the major entities in the organization, what their processing needs are and what effect that processing has on the data entities and the organization, he urged session attendees.

The choice of the first application is important, psychologically for the implementers and politically for the organization. He said it should be a visible application, but not a complicated one.

It is better, he added, if the activity to be supported is peripheral to the corporation. "But don't pick something that is too trivial" — that makes the whole of DBMS seem trivial, he explained.

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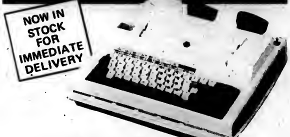

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'Jars' Adds Graphics Output

McLEAN, Va. — Release 3 of the IBM OS-oriented Job Accounting Report System (Jars) from Johnson Systems, Inc. includes an additional set of system use reports and "significant" enhancements to the basic package, according to a spokesman.

The extended capabilities are said to be particularly valuable to the OS/MVS user. All the relevant data captured by the MVS implementation of IBM's SMF is now "readily available" through Jars, both in the system use reports and as data elements in Jars report program, he explained.

Jars has been described as a comprehensive computer utilization reporting and billing system, tracking the DP environment and related activities. The system provides an accounting of all system resource use to assist DP management in financial control, operations monitoring, systems tuning and resource planning, the spokesman said."

The newly available system use reports are a set of graphs and tabular printouts which amplify the basic usefulness of Jars, he added. They were designed to help profile system utilization, identify trends and plan future workloads and resource requirements.

Although Johnson provides control cards to trigger production of what it feels are a good basic set of reports, the system also includes facilities by which the user can create report formats or modify existing ones.

OS Jars costs $8,000, the vendor said from 8400 Westpark Drive, McLean, Va. 22101.

'Earl', 'Datacom' Tied

DALLAS — The Easy Access Report Language (Earl), a nonprocedural retrieval facility originally developed in Europe, is now available to users of the Datacom DB/DC systems from Insyte Datacom Corp.

(Packaged as CA-Earl, the software utility is also available to the general IBM DOS, OS and VS user community from Computer Associates, Inc. in New York and from various affiliated companies in Europe.)

Using Earls' English-style, free-format command repetoire, the user can access both data bases and conventional files to produce reports on a regular production basis or in response to one-time requests, an Insyte Datacom spokesman said.

The software allows up to 15 control breaks per report and as many as 15 reports to be generated from a single run of the program. Spacing, page control, page headings, column captions and total and subtotal identifiers are all handled by Earl once specified by the user, he noted

The utility can handle eight sequential or Isam input files and these may be on card, disk or magnetic tape, he added.

Earl is available for $7,500, Insyte Datacom noted from 325 Oak Plaza Bldg., 3707 Rawlins St., Dallas, Texas 75219.

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Blindly Following Piper? — Part 2

User Programs Often Redundant

By Charles A. Gravitt
Special to CW

At the conclusion of last week's article, I noted that one effect of personal computing — encouraging end users to do their own programming as an adjunct to their regular tasks — might be that corporations lose the ability to support the programs upon which they have come to rely.

But there are other problems, too. For example, proliferation of the number of personal computing locations exposes a corporation to financing duplicate programming efforts.

To think otherwise presupposes that each personal computing location has unique needs that no one else in the corporation can use. Actually, few departments have unique needs — perhaps only Engineering and a couple of others.

Isolated Attention

Isolated needs get more attention than overall corporate needs. Data sharing between departments is less likely to occur. If the truth be known, one user department probably would not know what others were doing.

This has to lead to some redundant programming within the corporation, which should be taken into account to see if it is justified.

Everyone is cognizant of the fact that hardware vendors are in the business to sell hardware, and their success is measured by sales volume. Personal computing creates fertile ground for sales.

In addition to central site hardware, terminals and various support devices are needed. More demands for personal computing facility create opportunities for more sales.

Unpleasant Decisions

Multiplication of the personal computing sites is the main thing that could cause the unforeseen capital outlays — or some tough, unpleasant decisions when saturation of the central site is imminent.

It's a sort of progression that might happen. Sloppy, inefficient or unjustified programming by the personal computing users could place such demands on the host mainframe to cause the need for more expensive central site hardware. The user departments will have placed such reliance on it for their operation that the corporation will be hard-pressed to decline an upgrade.

More personal computing sites cause more upgrades — a cycle in which the process feeds on itself.

Early Danger Signal

Part of the rationale for personal computing is that a using organization will need less professional programming staff.

This virtue will be quickly tarnished when the first request is made by a user department for the transfer to that department of one of the professional programmers to do the personal computing.

Why will this happen? It is one way to answer the need for efficiency in the programming a user department will be expected to do once its request for personal computing facility is granted. The professional programmer, through long experience, has learned how to produce a product using the proper methods, even under heavy pressure. Having him would increase the likelihood that the user department will be able to deliver as promised.

If these transfers occur and the central site staff is dispersed, it is difficult to see where the savings to the corporation can be realized.

Distributed programming could undermine the checks and balances painstakingly developed over a number of years to control DP costs. From the corporate perspective, the overall knowledge of how the DP resources are being used, their effectiveness and their auditability are more difficult to grasp when widely dispersed.

Heavy controls will be required to ensure that unauthorized or marginally justified projects are not done. This could easily happen because the resources are under the control of those who want the computing work done, and some economic objectivity may be lost.

Unless personnel using the personal computing facility in user departments are selected with care and managed and monitored continuously, inefficiency will breed inefficiency and cause processing demands on the central site which inexorably lead to more hardware requiring substantial funding.

A corporation must weigh all considerations and ramifications before being stampeded down the glamorous personal computing path — or it may preside over the demise of cost-effective and productive DP services to its organization.

Gravitt is an attorney who served on the DP study team of then-Gov. Jimmy Carter's Georgia State Reorganization Project. He has had 16 years of DP management experience.

Interdata Adds Fortran Update

OCEANPORT, N.J.— An Extended Fortran IV compiler is now available for use on the 16-bit family of minicomputers from Interdata, according to a spokesman.

Described as "ideal" for use in environments where computing resources are at a premium, the compiler can be overlaid to function in less than 14.2K bytes of memory, he said.

It can compile most programs in less than 15.5K bytes of memory, generating executable object code directly from source statements, he added.

With this Fortran, the user can allow the compiler to determine allocated memory and page the symbol table to disk when available memory is filled. Extended Fortran IV is available now on magnetic tape for $250, Interdata said from 2 Crescent Place, Oceanport, N.J. 07757.

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Links Noncompatibles

Net Process Boosts Interface Options

By Ronald A. Frank
CW Staff

CUPERTINO, Calif. – Tymshare, Inc. has introduced a networking process that enables users to configure private packet networks by interfacing otherwise noncompatible equipment and protocols.

Called Advanced Communications Technology (ACT), the process includes hardware and software components that will also be introduced into the firm's Tymnet packet network. carrier subsidiary, a spokesman said.

ACT includes a minicomputer called the Tymnet Engine together with software designated Internally Switched Interface System (Isis). The Engine is a 32-bit machine with direct memory access, six levels of interrupt, 750-nsec cycle time, up to 32 high-speed synchronous channels and up to 256 medium-speed asynchronous channels.

Isis provides "dynamic internal switching" for dissimilar communications protocols, 64 job slots or communications interfaces and symbolic debugging facilities.

On one Engine, Isis reportedly can support asynchronous devices; synchronous network interfaces; packet assembler/disassembler (PAD) functions; gateway facilities to other networks under interfaces such as CCITT X.75, X.25 or Snap; and High-Level Data Link Control, Synchronous Data Link Control and the Advanced Data Communications Control Procedure (ADCCP).

Phased Introduction

Initially, the Engine and Isis will be supplied by Tymshare for configuring private packet nets, but the next step will be to introduce the ACT components into the operational capabilities of the Tymnet network to make the packet system operate with additional features. The final step will be to tariff the Engine and Isis for use at Tymnet subscriber facilities, a Tymshare spokesman explained.

The Engine is being built in-house by Tymshare, but components are off-the-shelf with little customized circuitry.

The key to the ACT system is Isis software, which was also written by the firm's staff. The software reportedly can support up to 64 separate partitions in one node, each of which can operate as an entirely separate communications environment, translating the protocol of an external device to a common internal protocol that passes through the Isis "dispatcher" to another partition. The second partition then translates the common protocol into that of the external device it is handling. Any number of partitions can communicate with the other partitions, the firm stated.

The ACT system is said to be particularly suited to users that have a diversity of terminals and protocols in operation and are considering a private network. Isis handler routines at each node take care of compatibility between otherwise noncompatible devices, the spokesman explained.

The key to interfacing devices or protocols to an ACT system lies in the Isis interfaces. Initially available interfaces include X.25, Tymnet, Tymnet/Tymcom (for non-Tymshare CPUs), Burroughs polling, Pars and other airline reservations systems, Datapac Snap. Under development are Isis interfaces for IBM SNA 3270, ADCCP, etc. Digital Equipment Corp.'s Decnet (DDCCP), Univac and Control Data Corp. protocols are also planned.

For private packet nets, the Engine is

(Continued on Page 40)

Bank Chalks Up 11% Increase In Productivity Using SNA

BALTIMORE – Equitable Trust Co. here effected an 11% increase in teller productivity and shortened average branch settlement to about 30 minutes from an average that had approached an hour or more by installing IBM's Systems Network Architecture (SNA) in place of a 60-year-old manual system.

By the early 1970s, the bank had expanded its teller-oriented services as fast as it had increased its number of branches, according to senior vice-president Robert D. Lockard.

Until 1974, teller operations utilized savings machines and an adding machine for every two tellers as the only mechanical aids. At that time, the bank was providing about 100 types of consumer services, including loan and credit card payments, utility bill payments and check cashing, Lockard said, and the number was increasing.

Bank management realized tellers needed a way to solve the problem of decreased productivity and also a method to shorten settlement time, which had increased beyond practical operation standards, Lockard said.

In the search for a new system, user orientation was the key to the final selection. The choice was IBM's SNA hardware and programming umbrella and consisted principally of 17 branch-located 3601 controllers, 125 Model 3604 display terminals and 125 Model 3610 printers.

By mid-1979 the bank expects to have 45

(Continued on Page 44)

Bell Switched Service Still Pending

NEW YORK – With AT&T apparently on the verge of introducing an all-encompassing data network, have Bell's plans for its Dataphone Switched Digital Service (DSDS) been scrapped?

Not at all, according to an AT&T spokesman. The Federal Communications Commission granted 214 approval for the switched digital service last year which gave the phone company the go-ahead to construct facilities.

DSDS actually will utilize many of the same facilities being put in place for the Dataphone Digital Service (DDS), so separate construction facilities are not required.

What still remains to be done in order for AT&T to offer DSDS? A tariff has to be filed with the commission. AT&T cannot now say when the DSDS tariff will be filed. However, this does not imply that the service is in any way being downgraded, the spokesman said.

Asked if it is possible that a new service offering might supercede DSDS, the AT&T source said only that the switched service would be available. However, when the tariff for it will be filed or when the service will be available to users has not been determined, he added.

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Portable Unit Prints 136 Columns

PARAMUS, N.J. — A microprocessor-based, portable terminal featuring 136-column printout has been introduced by Computer Transceiver Systems, Inc. (CTS).

Described as compatible with major mainframes, minicomputers and peripherals, the Execuport 4000 handles Ascii, APL and IBM correspondence codes and prints at 30 char./sec.

Weighing about 16 pounds, the portable terminal prints upper and lower case characters including descenders — such as "g," "j," "p" and "q" — with no reduction in character size, CTS stated. Underscoring, overscoring, subscripting and superscripting are also provided, the firm added.

The Execuport 4000 has a plotting capability with resolution of 24 vertical and 10 horizontal point/in. for graphic display of data and produces black or blue/black characters on either 8-3/4- or 14-7/8-in. white paper, a spokesman noted.

The Execuport specifies and locates a parity error by printing the erring character a quarter step above the line of output. This provides a hardcopy record of errors for program checking and analysis and requires only a small portion of data to be retransmitted after correction, CTS said.

Among other error detection and alarm features, the terminal has a "ready light" on its keyboard to indicate when a signal of sufficient strength is being received from remote equipment.

As a diagnostic aid, a sequential printout of the complete Ascii character set can be executed by depressing a special key, CTS said.

The user can specify special codes or character sets, such as chemical or mathematical symbols or foreign language character sets.

The Execuport 4000 terminal costs $3,495; first deliveries are scheduled in August from CTS at E. 66 Midland Ave., Paramus, N.J. 07652.

DEC Users Gain Modem

PORTLAND, Ore. — Nortek, Inc. has designed an auto-answer, auto-dial, low-speed modem for the Digital Equipment Corp. LSI-11 and LSI-11/2 microcomputers and the PDP-11/03 minicomputer.

The modem reportedly provides computer-controlled answering and origination of data communication functions when used in conjunction with a Bell CBS-type Data Access Arrangement (DAA). The number of data bits, parity and transmission rates of 110-, 134.5-, 300- and 600 bit/sec are software-selectable, enabling use with most available terminals, Nortek said.

The unit is priced at $650. First deliveries are scheduled for July from Nortek at 2432 N.W. Johnson St., Portland, Ore. 97210.

Process Adds Net Options

(Continued from Page 39)

priced at $60,000 to $100,000. The Isis operating system, which would allow an Engine to be used only as a switching node, costs $200/mo. The X.25 interface under Isis costs $400/mo with other interfaces priced from $250/mo to $450/mo.

Lease plans are available for the Engine with prices depending on length of lease. Isis software is available only on a monthly fee basis, and the price includes system support and all updates. When the ACT hardware and software are added on Tymnet, it will be available at tariffed rates to be filed with the Federal Communications Commission.

Tymshare, Inc. is at 20705 Valley Green Drive, Cupertino, Calif., 95014.

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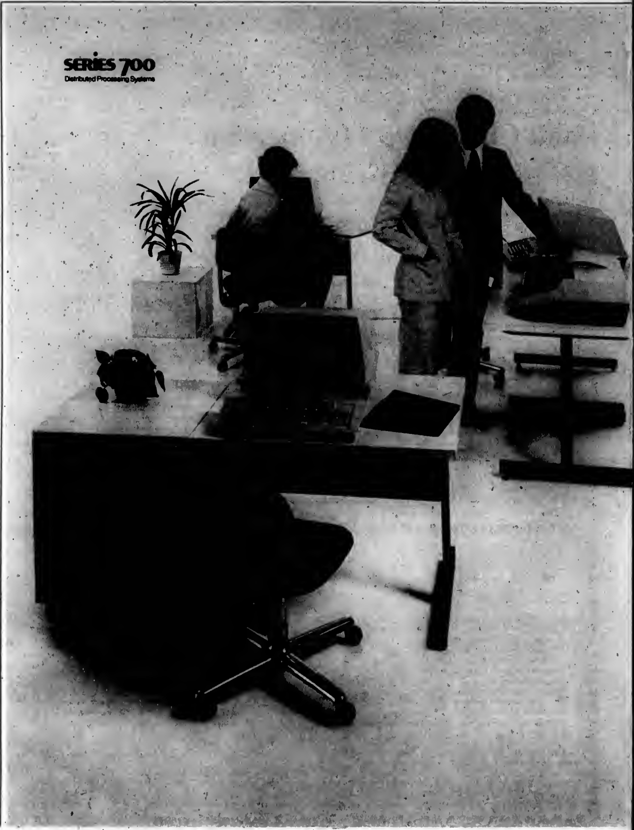

Atlantic Research Adds Remote Control Switch

ALEXANDRIA, Va. — Atlantic Research Corp. has added the RCS-100 remote control switch to its line.

The RCS-100 is a communications line-switching system designed to perform fallback switching and line routing, according to the firm. It can be controlled both manually or electronically from either local or remote locations.

The remote control switch is suited for use in any switching system that requires remote control via computer or standard telephone lines, while maintaining security through system access codes, a spokesman said.

The RCS-100 operates through a self-contained microprocessor that can be controlled by control entry through panel switches, control entry through the RP-1 remote control panel, serial data control entry from a data terminal or CPU or Touch-Tone control entry from a standard telephone equipped with Touch-Tone dialing.

Software for the microprocessor can provide switching functions for any control entry, plus alarm and status functions. System security can be maintained through the use of access and security codes controlled only by the user.

Interchangeable plug-in modules can accommodate four-, six- nine- or 25-wire RS-232C circuits. The RCS-100 was designed to handle up to 16 lines.

A 16-channel configuration sells for $4,400 from Atlantic Research at 5390 Cherokee Ave., Alexandria, Va. 22314.

Datatrol Banking System Costs Half of Competitors'

HUDSON, Mass. — Datatrol, Inc. has introduced a teller terminal system it claimed will perform traditional banking functions at half the average cost-per-terminal of competitive systems.

The FT-3244 system, with an average cost-per-terminal of $2,500, does not require a branch-level controller because each terminal has a microprocessor that enables direct communications with the host computer via telephone lines, the company said.

The terminals operate online, partially on-line or offline. The complete system consists of three components — the teller's console, which permits control over each event in a transaction procedure; the printer, used to prepare receipts, validate transactions and list console events; and the personal identification number (PIN) pad, used by customers to enter their own passwords for transactions requiring identification.

Up to six terminals can communicate through one drop on a multidrop network, Datatrol said.

The system is available from Datatrol at Kane Industrial Drive, Hudson, Mass. 01749.

Uniservo 10 Gets Low-Profile Units

BLUE BELL, Pa. — A low-profile version of the Uniservo 10 magnetic tape unit has been introduced by Univac for its Universal Terminal System 700 (UTS 700).

The Uniservo 10 tape unit configuration comes in a single-density phase-encoded (PE) unit and in a dual-density PE and NRZI unit.

The low-profile Uniservo 10 system operates at 25 in./sec with a transfer rate of 40k byte/sec PE and 20k byte/sec NRZI.

The price of the PE version is $12,145; on a five-year lease including maintenance, it costs $251/mo.

The PE/NRZI unit's purchase price is $13,425; monthly rental is $277.

TI's new 774 Intelligent Terminal System gets to the source of your processing needs.

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The 774 is the latest addition to Series 700 Distributed Processing Systems. It follows the Model 770, the industry's first intelligent terminal with a built-in thermal printer. All members of the Series 700 family speak the same language — TPL 700, so the 774 is easy to program and operate with minimal operator training.

☐ 774 protects your investment:
- Compatible Series 700 hardware/software family simplifies system expansion.
- All family members speak TPL 700, a high-level language specifically designed for data entry.
- Similarity of system operation minimizes retraining as system grows.

☐ 774 rapidly transmits clean data for lower communications costs.

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Multiple-CRT Configuration

NCR Adds POS System for Fast-Food Shops

DAYTON, Ohio — NCR Corp. has announced a modular electronic point-of-sale (POS) system designed to provide faster service and increased control in fast-food operations.

The NCR 2160 food-service system includes low-profile, multiple CRT terminals and 2 line/sec, 40 char./line matrix printers. The terminals and printers are linked to a 15-sq-in. microprocessor-based controller, a spokesman said.

Transactions are recorded via the terminal keyboard and automatically processed by the controller. As a by-product of recording each sale, information is stored from which the system can produce a variety of management reports.

For increased efficiency, the "micromotion" keyboard has a flat, smooth surface on which "keys" are outlined. Cashiers touch the appropriate positions on the surface to record the customer's order. The keyboard's surface is waterproof so that damage from spillage is minimized and the terminal is easier to clean, the firm said.

In addition, automatic calculation of taxes, price extensions and changes are combined with automatic price look-up, according to the firm. The cashier touches a key for an item and the system provides the price from memory. An optional printed receipt is available.

Regardless of the order in which items are entered into the terminal, the system rearranges the list so that all like items are grouped together when displayed on the visual display screen and printed, facilitating filling the order, according to the firm. Remote printers can be placed in the kitchen or other food-preparation area to list orders so that they can be prepared more quickly.

In addition to offering features that will help improve customer service, the system can be programmed to provide management control, the firm said. For example, it keeps track of sales information by terminal, salesperson, department and store, available in printed form on demand.

The 2160 system is capable of calculating perpetual inventories and product yields down to the recipe level, the spokesman said. Additional report modules available include time-and-attendance, labor-cost and other payroll information.

A typical 2160 system including four terminals, controller and a remote printer for kitchen use is priced at $15,690.

The systems will be available for customer deliveries in the third quarter.

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Bank Reports 11% Growth In Teller Output Using SNA

(Continued from Page 39)

controllers, 550 terminals and 550 printers, a spokesman said. Data speed on the equipment is 2,400 bit/sec.

The system currently runs on dual IBM 370/158s with 3M bytes of memory. By January, the system will consist of IBM 3032 and one 370/158 with an attached processor and will have 4M bytes of memory.

The system has a 3705 front-end processor. Equitable Trust uses IBM's Information Management System (IMS) application software and Vtam with SDLC protocol, according to a spokesman.

In June 1977, the system started off-line at two pilot branches and in November switched on-line. The bank now has more than 30 branches on the system. Lockard said the bank looked for a minimum 11% increase in teller productivity and sought to shorten average branch settlement to about 30 minutes from an average that had approached an hour or more.

"To date, everything indicates an achievement of our goals," Lockard said. "The pilot environment measurements adequately proved the projections that showed that once a teller became experienced with the new equipment, processing those transactions could be equal to or faster than the original projections.

"Indications are that we are going to achieve a substantial increase in productivity and that we'll have an average branch settlement time of 30 minutes across the system. Teller settlement time will probably average about 15 minutes," he said.

According to the spokesman, the installation process was plagued with problems, about which he could not be specific. "They were not typical problems at all. We were supposed to be the only ones in the country having this type of problem. They've been corrected now — that's all that matters," he said.

'Source/Use' Procedure

All transactions are divided into a "source" or "use" of funds. When the customer gives the teller the transaction — the "source" — the teller determines what to do with that money — the "use." Cash is always keyed in first and then checks. Next, the teller keys in where the money is to be distributed — to a checking or savings account deposit, for example, or to pay a gas or electric bill or an internal bill such as consumer credit. The teller no longer has to compute how much cash the customer receives, since the system does it automatically, Lockard said.

Every 10th transaction, the teller is instructed by the terminal to "press print." The teller must do this before the system can continue — and the terminal prints out the drawer cash total. Then the teller uses a cash sheet to make an actual count of cash on hand.

Should a teller leave the workstation, "interim sign-off" is performed. If anyone tries to put a transaction through in the teller's absence, the terminal will not accept it. When the teller returns and signs back in, the terminal asks for the teller's "secret number." Only when this has been given will the terminal disclose the last transaction and print the amount of drawer cash.

Audit Trail Available

Previously, tellers waited until the end of the day to know if their transactions balanced. Now, the entire audit trail is available. Totals are automatically accumulated, and at the end of the day the teller pushes a button to recall the data, Lockard said.

The printer will print out a tape of cash and checks as well as totals of all transaction types (with one copy retained in the terminal for the bank). After the tellers have settled, the system combines all the tellers' figures into group totals and produces a branch settlement sheet, eliminating the complex manual adding operation still used in most bank branches, according to Lockard.

The system was designed for minimum impact on customers. "The customer isn't really going to see too much of a change from the way we did business in the past. There may be a slightly different type of a receipt and passbooks may change some, but the bulk of our transactions are generally going to be the same as they were before," Lockard said.

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Touch-Sensitive CRT Debuts

BLOOMINGTON, Minn. — Information Dialogues, Inc. has introduced the Model 10 microprocessor-based touch-sensitive CRT terminal designed for use by nontechnical personnel in business, education and government.

The Model 10 allows users to enter and retrieve information by touching the unit's glass faceplate. The system responds to human contact by offering new display images that provide additional explanation and associated selections, a spokesman said.

The unit has a 15-in. screen that displays up to 80 char. on each of 24 lines, the firm said. The screen has 32 "touch pads." The removable keyboard offers local/remote, character interactive/page edit and carriage return only/automatic line feed.

The unit offers a 96-char. Ascii set displayed on a 7 by 9 dot matrix format, the firm said. The Model 10 is RS-232C-interface-compatible with switch-selectable transmission rates of 110- to 19,200 bit/sec operating in full- or half-duplex mode.

Basic price for a unit, including keyboard, is $4,100 with delivery in 60 days. The firm is located at Suite 429, 2850 Metro Office Park, Bloomington, Minn. 55420.

Teleprinter Line Suits Private, Public Nets

SYRACUSE, N.Y. — Leigh Systems, Inc. has introduced a line of automatic send/receive, keyboard send/receive and receive-only teleprinters intended for use in private data transmission networks, TWX and Telex services and as computer I/O devices.

The line consists of two series. The Series 800 teleprinters generate and accept signals in an 8-level, 11-bit binary code conforming to Ascii standards, according to a company spokesman. They are compatible with most computers, he added.

Series 500 models utilize a 5-level Baudot code conforming to CCITT #2 standards. Transmission rates range to 110 bit/sec for the Series 800 and 75 bit/sec for the Series 500, according to the spokesman.

The teleprinters operate at speeds to 100 word/min. Because they incorporate Western Electric Co. patents, they are compatible with similar teleprinter terminals, according to the firm.

Terminal Transactions

A variety of options is available.

In the Series 500, the ASR-32 sells for $1,156, with immediate delivery. The Series 800 ASR with manual reader is priced at $1,123 and with automatic reader is $1,191.

The firm is located at 6081 Court Street Road, Syracuse, N.Y, 13206.

Interdatas Get Terminal Adapter

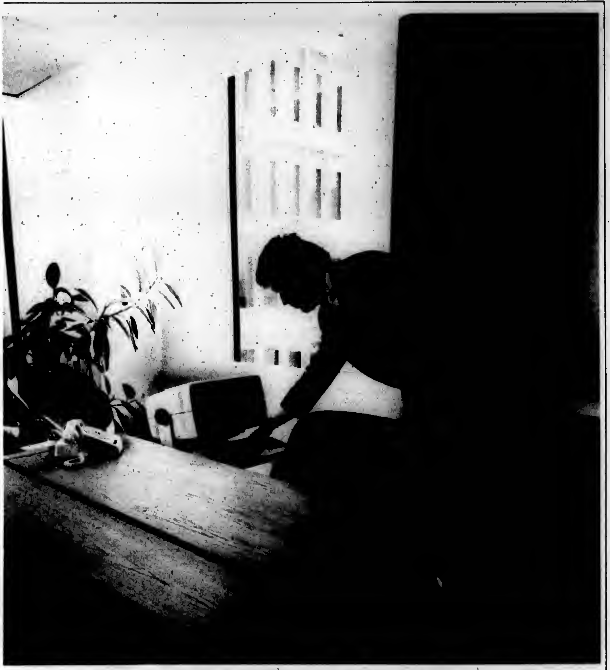
PLACENTIA, Calif. — RDV Engineering is now supplying Interdata, Inc. minicomputer users with an alternative for interfacing local RS-232C terminals. The Quad Asynchronous Local Terminal adapter (Qualta) provides four channels of serial data communications without Modem controls on a half board, the firm said.

The Qualta reportedly maintains both software and hardware compatibility with host products when used for local terminal communications and offers the following switch-selectable functions: consecutive 10-bit address field, duplex mode and 50- to 19,200 bit/sec transmission rates.

Low-power Schottky construction reduces power consumption of four channels 85% to .75, a company spokesman said.

Programmable word length, parity and stop bits allow a variety of CRT and printing terminals to be used, the firm said. Terminal status can be monitored with "data set ready" status, while all other modem status lines are unused and give no status.

Available immediately and covered by a one-year limited warranty, the Qualta costs $418.50 in quantities of 100 or more from RDV Engineering, 319 Dolores Circle, Placentia, Calif. 92670.



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INPUT TO THE FUTURE

June 26, 1978
Edited by Tim Scannell

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COM Offers Benefits to High-Volume Users

Special to CW

Computer output microfilm (COM) has four general advantages: It reduces computer printing time and its attendant costs, is faster than paper printouts for distribution and retrieval of information, is versatile and allows expansion of the information user base. These are all desirable objectives, but the advantages must be weighed against COM's disadvantages.

First of all, any system should be cost- or function-justified. If COM is used to reduce print runs on a computer, the volume of paper must be sufficiently high; as a rough rule of thumb, 100,000 printed pages per month must be potentially available for conversion to COM before a COM operation can be cost-justified.

Second, COM produces microfilm, which cannot be read without a machine — reader or reader/printer — and cannot be written on. The user will therefore have to adapt to a totally new way of handling information, and that places a burden on the system's installer and management who must educate and motivate.

This article is excerpted from Auerbach Publishers, Inc.'s Input/-Output Reports, *a three-volume monthly updated reference on all major facets of peripherals and data handling equipment.*

Production costs computed for a COM operation should include the following items: supplies (film, chemicals, spools), quality control equipment, the COM unit itself, film processor (if not a part of the COM device), labor and computer time required to output the data.

A paper-printout system's production costs, on the other hand, must include computer time, a line printer, paper, a decollator and a binder. These are the most obvious cost items. A more detailed analysis would cover such things as power, light and water consumption; software development costs; supplies, such as ribbons and/or ink for the line printer; and so on.

As a line printer replacement, COM produces and updates computer output files much faster and, assuming output of 60,000 or more pages per month, at a lower cost. Most line printers output at a speed of up to 1,200 line/min with no more than six copies per run. Faster line printers are in the offing, but they are not close to the speed of COM recorders that now produce between 18,000- and 26,000 line/min.

Mainframe Time Reduced

COM speed brings about economy that is most noticeable at the computer site — it cuts down on mainframe time. It should be noted, however, that some line printers operate off-line, so COM isn't the only alternative for reducing computer time.

However, even off-line printers use paper, and that is perhaps the biggest area in which costs can be cut with microfilm. In one recent year, the cost of paper increased by 40% to 50%, while the cost of film went up 10% to 15%.

It has been estimated, with all factors computed, that the cost of microfilming via COM is about one-fourth the cost of computer printing. Of course, the ratio varies depending on output volume.

Basically, there are two types of COM systems — on-line and off-line. A major advantage of the on-line sys-

(Continued on Page S/4)

Smoothes Data Flow

Fiche Generator Reduces S&L's Overhead

By Brad Schultz
CW Staff

SAN DIEGO — Home Federal Savings & Loan has cut DP overhead and streamlined data flow with its microfiche generation system, according to Home Federal's DP group operations manager, George Kanoff.

Home Federal stores data pertaining to teller and interbank transactions, general ledger accounting and other financial activities on magnetic tape and then creates microfiche records of this data for on-line access by its numerous branch offices, Kanoff said.

Home Federal finds that its Datagraphix, Inc. Autocom system is simple to operate, requires little previous instruction and has made data flow much more efficient among the institution's numerous branch offices, Kanoff stated.

Prior to acquiring Autocom, the institution had relied on service bureaus to produce the microfiche, he noted, explaining that on a daily basis, accumulated magnetic tape records were picked up by a service bureau and microfiche records of the taped data were produced at the bureau's facilities.

This arrangement proved unsatisfactory, Kanoff stated, indicating that transportation of tape to the service bureau and of fiche from the bureau back to Home Federal was unreliable and the procedure's weakest link.

As a result, Home Federal decided to develop its own microfiche generation facility driven by the institution's two IBM 360/65s, he said, adding these CPUs each feature 1M byte of core and support IBM's Edos Tape Management System and Cullinane Corp.'s Integrated Data Management System.

However, the savings and loan is just now replacing one 360/65 with an Itel Corp. AS/5 Model 3, that firm's IBM 370/158 "workalike," Kanoff noted.

Choice of Output Modes

Datagraphix provided the Autocom system and a special software module enabling Home Federal to generate records from magnetic tape input in either hard copy or hard copy/-microfiche modes, he continued.

By agreement, Datagraphix automatically provides Home Federal with microfiche and duplicating film. So far this year, the institution has received 36 rolls of microfiche film and 80 rolls of duplicating film, Kanoff noted, adding that one roll of the former is consumed every 10 days by his firm.

Home Federal selected Datagraphix' Autocom after rejecting offers from Eastman Kodak Co., NCR Corp. and Qantel Corp., he said.

The company has also acquired a large stock of customized peripheral equipment; 550 Lear Siegler, Inc. terminals and a large number of Okidata Corp. printers, Kanoff said, noting that every Home Federal branch has a CRT, keyboard and printer for communication with the institution's central DP facility in San Diego.

In an average day, Home Federal generates 120 microfiche records from 37 master tapes, Kanoff stated, explaining that one master stores the equivalent of 208 pages of 11 by 14 by 3/8 in. computer output paper.

Moreover, in its quarterly fiscal report, Home Federal generated 87 master tapes on the last report and made 60 copies of each master. Microfiche stored the equivalent of more than one million output pages, he said. The 1978 year-end quarterly will entail around 120 masters, he predicted.

(Continued on Page S/4)

COM Turns Brokerage Into Publisher

By Marcia Blumenthal
CW Staff

LOS ANGELES — If computer output microfilm (COM) technology did not exist, a computer-based publishing house here may have remained a brokerage firm sharing in the ups and downs of the stock market, which over the last few years has come to resemble the medical chart of a malaria patient.

Instead, William O'Neil and Co., the 130-employee DP-based publishing house — which has all of its output on microfilm — is thriving. Sales recently hit $8.5 million.

"We print about 100,000 original pages a month through the system," according to Vance A. Griffitts, vice-president of marketing. For the past five years the system, composed of a Burroughs Corp. B6700 mainframe and an Information International, Inc. FR 80 COM graphics recorder, has produced *Datagraphs*, a 700-page book of stock charts and information compiled every week.

"We have to have tremendous speed," Griffitts explained, "because we produce 10,000 charts every Friday." A chart takes about one second for the FR 80 to produce, he noted.

Each chart provides a record of a stock's performance during the preceding week and, by using the company's data base, can be extended to show results for the past 10 years.

The graphics contain information on more than 80 fundamental and technical factors that influence the prices of stocks listed on both the New York and American exchanges.

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CRT/Printer Units Now Economically Feasible

By James Folts
Special to CW

One of the most obvious needs of the DP community is an inexpensive and quiet terminal that combines the display advantages of a CRT with the hard-copy capability of a printer, all at a reasonable cost to the user.

While users find the low cost and high speed of modern CRTs very attractive, they cannot ignore the ever-present need for hard copy. The expense of adding a printer to a CRT has caused the majority of users to purchase keyboard printer terminals, leaving them no alternative but to tolerate the noisy printers and reams of unnecessary paper.

Recently, several inexpensive thermal printer mechanisms and printers have been introduced which can present viable solutions to the problem. Printing on paper of various widths from 4 in. to 11-1/2 in., these devices can be inexpensively built into, or sold along with, CRT terminals to provide the occasional hard copy needed by CRT terminal users.

Simultaneously, they allow the user to take advantage of the CRTs' quiet speed. While many users will not find aluminum-coated or tape-width paper acceptable, the wider, 8-1/2 in. by 11-in., standard-size paper is ideal for copying the contents of CRT screens.

The problem with most of the "packaged" solutions previously introduced has been the cost of integrating CRTs and printers which were designed as independent computer peripherals.

Several manufacturers are designing printers as CRT peripherals rather than computer peripherals. Since these printers carry none of the firmware overhead inherent in freestanding, keyboard printer terminals such as the need to see the last character printed and the need to print a character at a time, a significant cost savings is realized.

Most printers of this design are able to transfer the entire contents of the CRT screen to memory, then print the page. Operators are able to resume their data entry or inquiry tasks at the CRT in as little as two seconds, eliminating the need to wait until the printer has finished copying the CRT screen's contents.

Users accustomed to dealing with printer terminals are quite concerned about the time terminal operators are required to wait. They want minimal interference by the printer with subsequent CRT operations.

Examining the basic question of time, it becomes apparent that there are two aspects: first, transferring screen data to the printer buffer and, second, printing that data. The 2-sec transfer rate of CRT peripheral-printers is practically unnoticed by the terminal operator and answers the first question; the 20 seconds required to print the page solves the second question. Printers of this type are sufficiently fast since the operator cannot prepare another screen for printing in that short a period.

The interesting aspect of these CRT/printer packages is the range of price/-performance they will make available to end users and OEMs alike. At the low end, where printers are to be combined with simple, interactive CRTs, terminal manufacturers or OEMs will be able to offer CRT/printer packages at prices less than many matrix printer/terminals without CRTs. At the same time they will be capable of outperforming the 100 char./sec teleprinters in performance, operator productivity, convenience and silence. And of course, paper costs are lower because of the units' selective printing capability. No longer must a meaningless audit trail of interactive dialogues and terminal commands be preserved only to be thrown away.

At the mid-range, when CRT/printers are combined with editing CRTs, not only does the user have the extensive editing, block transmission and forms-drawing capabilities plus the ability to depict bar graphs, but screen forms and bar graphs may be transferred directly to hard copy. Even inverse video will faithfully be reproduced as inverse printing. The user can therefore save the costs of special forms by copying them from CRT screen to printer.

In the high-price range of CRT terminals, there are already CRT/printer combinations available. But even here the page printer concept enables OEMs and users to realize the same benefits: increased operator productiivty, quiet and selective printing and lower costs,

The CRT/printer terminal concept is now an economical reality for price-sensitive applications. Advancing LSI technology has once again provided the means by which the computer industry can give the end user what he really needs — at a cost he is able to pay.

James Folts is vice-president of Perkin-Elmer Data Systems and general manager of Perkin-Elmer's Terminals Division.

Color CRTs About to Come of Age

By Charles A. Muench Jr.
Special to CW

NORCROSS, Ga. — If the '70s go down as the decade when the technology of the microcomputer was developed and refined, the '80s will surely stand out as the decade when color comes of age.

The inclusion of color is part of the logical progression of developing hardware and software that are more responsive to individual system demands. But, just as important, color represents a flexible and sophisticated new tool for individual operators.

Aside from the obvious appeal a color CRT has over one offering just black-on-white or white-on-black characters, there are also some scientifically based facts that support the benefits of color coding. One experiment, detailed in the *Journal of Applied Psychology*, involved 22 men and women with normal color vision. Each individual viewed, in sequence, a total of 180 displays in two experimental sessions.

The displays consisted of random alphanumerics, significantly "cluttered" to increase the complexity of the viewing screen. In half of the displays used, there was no color coding; the items were white on a dark background. In the other half, all the symbols in an item "were displayed in a particular color with the color code chosen to be redundant with the class designator letter," according to the journal.

Displays were shown in pairs — with and without color — and subjects were told to scan the display to find a particular item. A performance measure was then taken on the amount of time it took each individual to locate a specific item.

The results of the study showed that "color coding markedly reduced both search and counting times as well as counting errors," according to the report. There was also a sizable reduction in the number of counting errors when color was introduced to the subjects. "As compared with black and white displays, the color-coded displays resulted in an overall error reduction of 76% in the counting task," the report noted.

Color coding succeeded in increasing the discriminability among items of the various classes. "This improved separability has the effect of making the spacial distribution (patterning, clustering) of the randomly placed items more perceptible and serves to guide the eye during search and counting tasks," the report said.

Color and Shapes

In another study, which used military symbols, geometric forms and aircraft shapes as well as a variety of colors, the results confirmed the effectiveness of color for a counting task. The experiment, which appeared in a later edition of the *Journal of Applied Psychology*, indicated that "when color and shape are superimposed on a display, the color code will prove dominant in the visual separability it provides."

The experiment also showed, however, that as more colors are added to the display there is a decrease in the average discriminability "that would eventually reduce the effectiveness of the color code." In short, colors should be limited to a minimum of five and a maximum of 12, depending on viewing conditions.

Similar experiments documented a quicker man-machine interaction when color-coded alphanumerics were used as well as a reduction in the incidence of operator fatigue.

Taken alone, any one of these findings is important in its own right, but taken as a whole they become a combination of advantages that is hard to ignore as a vehicle for increasing operator efficiency. And with the advent of sophisticated low-cost color, the benefits to individual operators take on even greater significance.

On the systems development side of

(Continued on Page S/8)

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(Continued from Page S/2)

tem is that it costs less than most off-line units because it doesn't have a tape drive, nor does it usually have the multiple size film output (16m, 35mm, 105mm) capability. Programming for this type of system must be handled through the CPU.

Off-line systems without minicomputers must also be programmed through the host computer, the instructions being recorded on magnetic tape along with the data. Some COM systems, however, provide a means for programming commands such as for calling up the correct forms flash through the unit itself.

All COM manufacturers supply at least a minimal amount of software. Basic programmed instructions accomplish the following: data is output to magnetic tape instad of to a high-speed printer, the format (page/image) is modified if necessary to fit the specific COM unit and the tape is coded so that it can trigger the proper forms flash.

As COM users have gained experience and are putting more applications on microfilm, the demand for more flexibility has been growing and is reflected in increased interest in minicomputer-driven systems. The mini can be configured with storage devices and can be programmed to do a variety of functions. The mini also frees the main computer so all it has to do is output data to magnetic tape.

The final product or output of the COM system should be given appropriate consideration in deciding on a COM unit. The surest test for COM output is examination with the naked eye. Obvious differences the user will notice in output from different systems are the character font and character sizes. Some units have only one font and one size; others, one font but in three sizes; others, multiple fonts and multiple sizes. The number of characters per font also varies from system to system. Most have a minimum of 64 characters per font while others offer as many as 128.

In a graphics system, the drawing will be generated using either a dot matrix or stroking technique. Most systems use the matrix. As the number of dots in the matrix varies, it affects the quality of the output. More dots mean clearer reading.

Indexing Critical

Finally, indexing should be treated as a critical feature in active microfilm systems. Most COM manufacturers have recognized this need and developed indexing capabilities for their COM units.

The most common type of index is simply a rectangular "blip" mark recorded under or next to each frame of film. Those blips are counted in some automated retrieval systems. Indexing data could also be routed onto magnetic tapes by the host computer in an on-line system or by a minicomputer in an off-line configuration. Indexing can, in fact, become quite refined and sophisticated, depending on how much computer time the user wants to use and how much software he wants to develop.

COM, for better or worse, is married to the computer system although user organizations still are unsure of who should manage it. That situation is likely to continue for some time.

One advantage to the COM industry is that COM, unlike computers, has usually had to pay its own way right from the beginning and most in-house systems are installed after the user has had some experience with a COM service center. So, the changes wrought when the COM unit moves in-house are, at least, less radical, disruptive and frustrating than those caused by the company's first computer.

Fiche Generator Slices Overhead

(Continued from Page S/2)

Home Federal keeps its masters in a locked vault. Kanoff pointed out that, as a financial institution, Home Federal must keep a number of diffrent record types accessible for a minimum period of time in accordance with Federal Reserve Board regulations.

Branch Independence

Each of the firm's 59 branches maintains its own microfiche reserve and is thus not dependent on the San Diego DP center for the latest information on personal accounts, he said, noting, however, that all branches are interconnected in a data network called Vision.

The technical support group handles all system maintenance throughout California, Kanoff added. Kanoff heads all of Home Federal's DP operations — its operations analysis group, which handles internal software development and the tape-to-microfiche conversion; the DP center; and the technical support group.

Kanoff's "high guess" for the Autocom operation's annual overhad, excluding the wages of operating personnel, is about $8,000. Autocom precludes the need to consume $24,000 worth of paper annually on the quarterly reporting alone, he said, noting this yields a net savings of $16,000 in that one application.

But more significantly, Home Federal cannot *print* records fast enough to meet its needs given its current volume of transactions, he said, indicating that the institution is now compelled to use the medium of microfiche in creating records.

In addition, the Autocom system eliminates the need to employ a large clerical staff for handling the records, Kanoff added.

"We have computer operators that go over to the Autocom machine, mount up the tape and virtually walk off and leave it,'" he said.

"It starts spitting out masters like crazy. Then we have a clerk-type wearing white gloves [who] takes the masters, inspects them, puts them one at a time into the autocopier, dials in the number of copies she wants and makes those," he continued.

Kanoff said the biggest problem with the Autocom process at present is collating after copying, but he predicted that "in the not-too-distant future" the collating procedure will be further mechanized, eliminating a number of slow manual stages.

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Industry Boosts 96 Vendors

Printer Advances Promise Increased Diversity

By Kenneth C. Freund
Special to CW

The rapid pace of computer printer technology has not only kept up with computer technology but may have surpassed it in terms of diversity.

There are 96 vendors with a total of 309 printers or printer families — using about a dozen techniques ranging from 10 char./sec cylinders and balls to sophisticated 14,000 line/min laser-xerography.

Industry trends seem to indicate multifaceted movements toward consolidation of large processor sites, expansion of distributed computing and installation of independent small systems — all of which impact the computer printer market.

Centralization within a user company will result in large, general-purpose systems becoming even larger. In some instances, high-throughput printing devices will be required at the CPU site. A classical current alternative, of course, is multiple-printer installations — for example, three 600 line/min printers instead of one 1,800 line/min unit.

As the ultra-high-speed printers gain acceptance they will surely find application in central computer sites. Their cost, however, will be a limiting factor and medium- to high-speed line printers will continue to dominate with about 70% being in this category. Units operating at less than 300 line/min will make up the remainder.

Remote Printing

Computing-resource consolidation is not necessarily associated with consolidation of the printing function. And this will be one of the significant growth areas by the end of 1981. On-line data entry, via CRT terminals, will be accompanied with remote hardcopy printing at the entry site.

There is also a strong trend toward distributed processing in which computing resources are spread throughout an organization and linked through a communications network. Each satellite computer has complete printed output capability.

Distributed data entry is accomplished through the use of intelligent or nonintelligent terminals, again located at outlying points. Such terminals may be either independent or clustered devices and require printers for hardcopy output, in a manner similar to that of centralized processing with on-line entry.

As both small business and terminal-based systems become less costly, their utilization is expected to proliferate. Both of these areas are expected to be extremely strong markets for printers in the future.

This migration away from the typical computer room, while not causing great technological changes, will bring about subtle changes as printers move into the office environment. A recent survey indicated that 80% of the printers in DP rooms had no noise barrier between equipment and operator — obviously an intolerable situation in most offices.

Look for the new generation of printers to be quieter, aesthetically pleasing and compact. Europeans already express sensitivity toward noise. It will only be a matter of time before users insist on quieter machines.

Offices don't have static guards woven into their carpets (common in computer rooms) if they have carpets. One of the tough design problems now being addressed by printer manufacturers is print mechanisms that withstand reasonable levels of electrostatic discharge.

Power Consumption

Power consumption will be another sensitive area, not simply because of rising energy rates but because of equipment costs for accommodating heat. For example, incorporating high-energy magnetic materials in the printer's hammer mechanism not only reduces hammer power consumption by 60% but also eliminates the necessity of cooling the hammer bank — a dual end-user benefit.

Reliability, although intrinsic to lower heating, has in the past taken on the "numbers game" connotation with dull mean-time-between-failure (MTBF) figures that have very little meaning to anyone but reliability engineers. As printers are applied outside of metropolitan areas, reliability will take on its true meaning — part of the ownership cost.

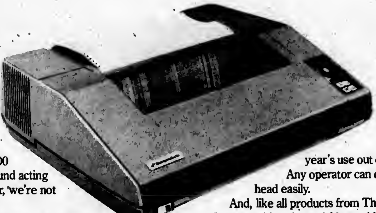
Small systems and remote terminals are sold on their low cost and are often located many miles from the closest service center, making repairs both time-consuming and costly.

With rising labor costs, difficulty in obtaining trained technicians and a more widely dispersed customer base, systems manufacturers will look closely at MTBF figures; end users will expect their equpment to work all of the time, for practical purposes. When there is downtime, inexperienced operators will probably have to diagnose the problem and describe it over the telephone.

Thanks to the microprocessor, future printers will have more intelligence; not simply for control but to provide diagnostic routines. Distributed networks, stand-alone computers and ter-

(Continued on Page S/10)

WHO DOES THIS PRINTER THINK IT'S KIDDING?



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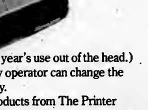

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Flatbed, Drum Plotters Differ in Advantages

Digital plotters available today can be classified by the type of plotting surface provided, the recording technique used, the method of line drawing and the method of specifying the plot. From the standpoint of the operational mechanism, perhaps the most useful classification is by the method used to mount the plotting surface on the plotter.

The two usual categories for this classification are flatbed-type plotters (in which the plotting head moves along two dimensions over a fixed plotting surface) and drum-type plotters (in which the plot is produced by a combination of the motion of the plotting head from side to side and the motion of the plotting surface backward and forward).

This article is excerpted from Auerbach Publishers, Inc.'s Input/-Output Reports, *a three-volume reference on all major facets of peripherals and data handling equipment.*

Flatbed plotters incorporate a fast plotting surface ranging in size from 30 in. by 30 in. to 5 ft. by 24 ft. The paper generally remains stationary throughout the plotting of a single graphic image. The plotting mechanism performs all the necessary movements, although automatic paper feed is available optionally for many flatbed plotters but is used only between one graphic image and the next.

Paper, or another plotting medium, is usually held to the plotter surface by a vacuum applied from below. Generally, the plotters are operated with the plotting surface horizontal, although some models have a tiltable surface and can operate with the surface in any position from horizontal to vertical.

The writing mechanism consists of a carriage and writing-tool assembly that moves along one axis of the plotting surface while the tool assembly is also free to move along the other axis. Motion in the X or Y direction or in both directions simultaneously is thus possible, enabling the plotting tool to reach any coordinate value within the plotting area. Usually the positioning mechanism for flatbed plotters consists of screw drives in the X and Y directions, which may be actuated by digital or analog signals.

Versatile, But Expensive

Flatbed plotters are generally more versatile, accurate and expensive than other types of plotters such as the drum-type, but such options as multiple-tool heads or photographic plotting attachments are frequently offered becuse the plotting head is mounted on a large moving assembly.

Drum plotters feature a movable plotting surface in conjunction with a writing carriage to provide the required two-dimensional motion. In these units, the writing element moves along one axis while rotation of the drum supplies movements along the other coordinate.

Most units employ an incremental plotting technique that produces a graph by a series of fixed incremental steps of the drum and/or carriage. Bidirectional motors are used to control motion along both the X and Y axes so that each input digital signal causes a small incremental step (.01 in. or less) of the carriage, the drum or both. A third (z-axis) input signal is used to control the raising and lowering of the pen from the surface of the paper.

Compared with flatbed plotters, drum-type plotters are compact and low in cost and offer the capability to produce single plots as long as the roll of paper. The main disadvantages are that they can only produce plots on paper with a single tool, since paper is the only medium that can be fanfolded or rolled suitably and the plotting head assembly will support only a single plotting tool.

For applications involving large amounts of paper, and where accuracy is not paramount, drum-type plotters offer an attractive solution to equipment requirements.

Film plotters produce output on photographic film but are not strictly a separate class of device since optical plotting heads are available for many table-type plotters.

Film plotters, because they use light-sensitive material, have given birth to many specialized techniques. One type of system uses a CRT projection medium to generate an image on photographic film. Another approach utilizes a laser beam deflected by a mirror to generate an image directly on film by left-to-right scans.

Advantages of the laser-type plotting technique are that plots in different shades of gray can be produced by modulating the beam, and plots as long as a roll of film (100 ft.) can be produced — something particularly important for seismic applications.

Photo Plotting's Disadvantages

A disadvantage of photographic plotting in general is the need to complete the plot and process the film before the plot can be inspected, although rapid photographic processing machinery is now available. Some vendors have developed a CRT display for use with photographic plotting systems that allows plot data to be checked visually before the plotting starts.

Electrostatic plotters, also known as nonimpact printer/plotters, are being used with increasing regularity in both

(Continued on Page S/10)

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Special to CW

MIAMI — A manufacturing company here, active in the truss plate design industry, has managed to cope with the problem of engineering turnaround times by installing a computerized drafting system.

Monex Corp. uses the system to produce complicated drawings and designs of trusses, the frames used to support the roof or floor of a building. When builders who are bidding on construction jobs call the company for estimates, "they want to know what the truss is going to look like, what kind of lumber is going into it and, of course, what plates are needed in order to bid," Len Naurison, vice-president and director of sales, said.

Using the system, civil engineers at Monex can produce in four minutes a drawing that would normally take a draftsman three days to two weeks to complete, he said.

Monex Corp. vice-president Len Naurison and chief engineer Mehmet Ilter compare a customer's specifications with similar plans in the company's library of truss design. Ilter prepared floor and roof specs and the system completes drawing with lumber, plating, forces and span information.

When the company decided to purchase a computerized drafting system, Naurison said, the most important consideration was the plotter. "We needed a machine that could turn out the very complicated drawings we require" while at the same time retaining "the speed and reliability demanded in this business."

The company selected a California Computer Products, Inc. Model 936 plotter, which is driven by a Hewlett-Packard Co. 9640A minicomputer.

Going Strong

"We've been operating eight hours a day for four years," Naurison explained, "and we still haven't found any limitations to the systems."

Monex customers have a number of ways to obtain the truss information they require, Naurison said. Builders may call the company, using a toll-free number, and provide the operator with details about the proposed project. This information is coded and entered into the computer and, within minutes, a permanent working design is completed.

Appropriate information can be called back to the builder and the drawing can be forwarded to the customer the same or the following day — or it can be stored in the system's memory until needed.

Customers also have the option of purchasing a terminal through which they can operate the plotter system off-line or through the telephone. These customers give the necessary specifications to the firm's operator verbally, or they enter coded information directly into the system by phone.

The computer will accept the information and process it while the customer is on the line or hold the request until the machine is available. Again, the drawing can be forwarded to the builder at once or held until he is ready to build, Naurison noted.

The information fed into the system by the builder includes such statistics as lumber sizes and grades, plating information and all the necessary forces and span data such as dead load, live load and bottom force, Naurison said.

Partial Specs

"Unlike drawings done by hand," he added, "we don't have to allow a margin for error. In fact, if a customer furnishes the proper load and code requirements for a particular job, we can determine final figures even if we're given partial specifications, something

(Continued on Page S/16)

Drum plotter draws floor and roof trusses based on information supplied by builders.

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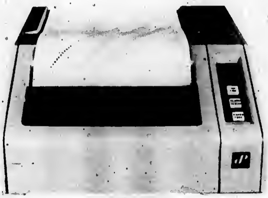

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COM Turns Brokerage Into Publishing Concern

(Continued from Page S/2)

The leased FR 80, a stand-alone system, is fed by a tape generated from a 1G-byte disk that stores the data base generated by the B6700. The mainframe generates that data base through a communications system that collects data from stock market sources such as the Securities and Exchange Commission and Interactive Data Corp.

Upgrade Awaited

At the present time, O'Neil is awaiting delivery of Comp 80/2, an upgrade to the FR 80 system. The user will also lease that machinery.

"The new system will do the graphics work the same way as the old system," Griffitts said, "but the upgrade will allow us to get more of a typeset, professional appearance and will provide a variety of applications not available with the older system."

For instance, Griffitts is excited about the variable-spacing capability of the Comp 80/2. Presently the user is printing in stick characters, which were designed for microfilm applications, not publishing. The variable-spacing feature will provide compaction and enhance the appearance of the output.

Multiple fonts are another feature which will improve the output's aesthethics. In addition, Griffitts noted, the latest system has a lot more available software. He summed up the upgrade by saying, "It's a lot more for the money."

In trading up, Griffitts said O'Neil did not consider products from any of Information International's competitors because, in his opinion, there is no competitive device that would do the variety of work required by the company.

Even though the Comp 80/2 has yet to be installed, Griffitts is anticipating future upgrades. In the next couple of years, he expects to add the rest of the features available with the system.

Specifically, the company is eyeing a scanner feature which can be fed images, convert them to digital form and then recall them in rescaled, rotated or otherwise modified form. Griffitts foresees the use of this feature for on-line, time-sharing applications, such as viewing real estate offerings.

Although the computer generates microfilm output, Griffitts said O'Neil has never sold one piece of microfilm. Instead, the company has developed a projection platemaker that burns printing plates directly from the 35mm film output.

Currently O'Neil has nine presses pounding out the weekly $1,000-a-copy *Datagraphs* subscribed to by 250 users. The firm also has seven other products relating to the stock market, securities and the economy which have evolved from the same data base. These range from custom reports to magazine formats used by more than 10,000 customers.

Recently, O'Neil expanded its operations to publishing parts catalogs and manuals for 40 customers including Toyota, Kawasaki, Pacific Telephone and Merrill Lynch.

The entire operation is handled on the premises.

Color CRTs To Come of Age

(Continued from Page S/3)

the coin, both color-coded alphanumerics and color graphics are playing increasingly crucial roles.

With the addition of color, businesses can develop programs that will display and color code their inventory based on quantities at hand. For instance, green might designate fully stocked items; yellow, items that need to be reordered; and blue, out-of-stock items.

Utility companies have turned to color graphics to be able to quickly locate system components, and in energy management; color graphs or charts give meaning and vitality to statistical data on how to cut a peakload or spread it out more evenly.

However, from the very beginning, educating end users as to the advantages of color has been a slow process. And for those with the foresight to see the advantages, high prices invariably became a major stumbling block. But as color comes in line with black-and-white prices, there has been a major shift in buying attitudes.

End users are realizing that if they can incorporate color terminals into the systems they are upgrading with new terminals, they will be buying more efficiency. And by the same token, if systems manufacturers can offer their customers color at a black-and-white price, they are marketing a better product.

Muench is vice-president of research and development for the Intelligent Systems Corp.

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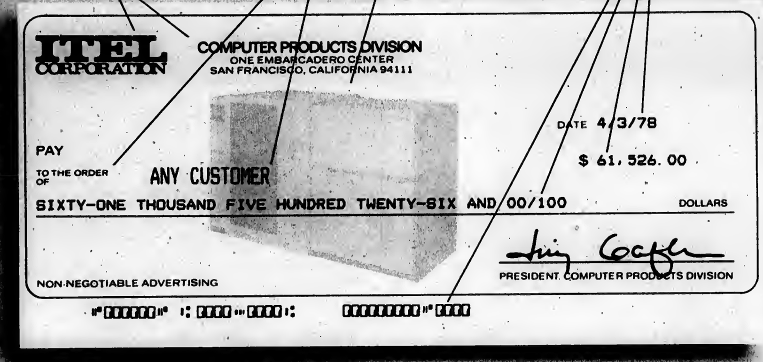

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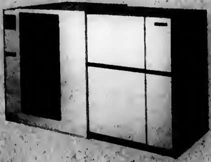

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Diversity in Store as Printer Design Advances

(Continued from Page S/5)

minal operators will perform DP operations as a secondary function. Their primary function may be management, nursing, secretarial work, material receiving or a host of other occupations.

When the print operation ceases, the operator will press a button. The printer will determine, for example, whether the printer; the CPU or the communications network is at fault. Further routines will report the problems quickly. The operator will be prompted to correct minor problems, eliminating many unnecessary service calls.

Should repairs be necessary, the operator will be able to more accurately describe the problem. When the repairman arrives, he can bring the necessary replacement parts and tools, alleviating unnecessary delays.

Despite increased reliability and intelligence, printer prices will decline over the next five years. The case of the 300 line/min line printer is a classic example. Its single-unit OEM price has dropped from $18,500 in 1962 to $7,700 in 1968 to $4,500 in 1977. The same trend is true in any speed class.

There is an average 7%/year decline in printer prices. This is not caused by price erosion but by new development. As new printers are designed and introduced, in about three-year cycles, the annual price reduction avetages 7%.

Growth among the various segments of computer applications will change the printer market's complexion in many new areas while increasing shipments in more mature markets.

In the independent market, impact printers will continue to dominate with over 270,000 units compared with 150,000 nonimpact units. Form character printer deliveries will lead the impact field with 39%, followed closely by line printers with 36%. Serial matrix printers will make up the remaining percentage.

Character printers, because of their slow speed, are expected to find more applications in the word processing or office information areas — when print quality and paper handling are important qualities. They will constitute only about 20% of the dollar market, however.

Line printers will continue to be the workhorse of the computer industry with applications in general-purpose, minicomputer, small business systems and terminal areas.

By 1982, line printers will represent nearly 60% of the total independent manufacturers' dollar share of the impact market and over 44% of the total market.

Serial printers, because of their relatively wide 60 char./sec to 400 char./-sec speed range, will find more applications in the minicomputer, small business machine, terminal and microprocessor system areas. The annual delivery rate in these areas is expected to double during the next five-year period, contributing about 20% to independent printer manufacturer's revenues.

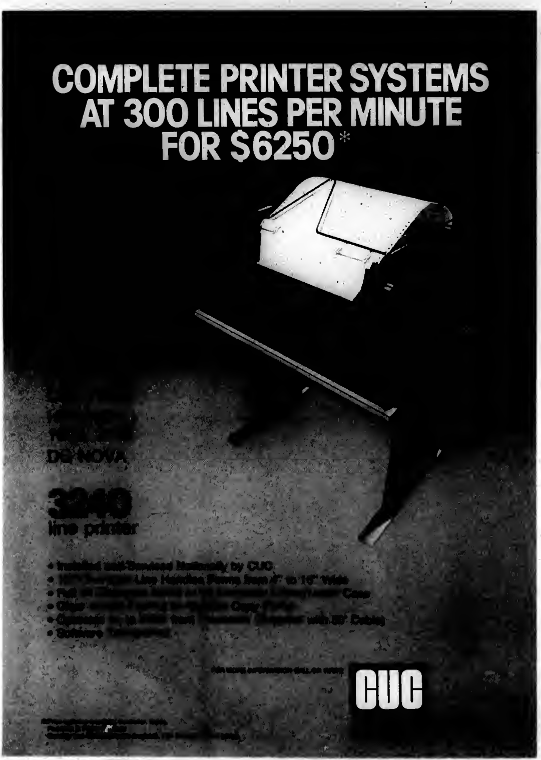
Because it is a relatively new technology, nonimpact printers (with only about 3,500 units delivered in 1976), are expected to experience the greatest growth rate during the next five years.

By 1982, the nonimpact printer is expected to be applied across the board from large-mainframe installations to highly remote terminals. The predominant use will be with minicomputers on down, principally because of the thrust of manufacturers with low-cost, general-purpose printers.

For all of their glamour, the ultrahigh-speed electrostatic, xerographic and ink-jet printers will have small impact on the overall market. The $145,000 to $310,000 price range will tend to limit the number of installations to those large systems that require extremely high output.

Impact printers will still dominate the market for most general applications, but there will be increased use of nonimpact printers for specific applications in which price/performance or convenience is superior to the other approaches.

Kenneth C. Freund is with the Business and Planning Office of Dataproducts Corp., Woodland Hills, Calif.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Plotters Differ In Advantages

(Continued from Page S/6)

scientific and business applications.

In an electrostatic plotter, the paper moves in one direction passing over a row of fixed styli spanning the width of the paper. These styli, or writing electrodes, which may be spaced at up to 200/in., create small electrostatic charges on the paper at the active styli positions. The paper is then exposed to a toner, producing a permanent image.

The prime advantage of this type of plotter is speed, especially of character generation. This is because characters are of the dot matrix-type and do not have to be drawn as is required with other types of plotters.

There are, however, two disadvantages: resolution and special programming. The resolution is not high enough for fine drawings, such as those needed in cartography or integrated circuit mask design. Special programming is required since lines and graphs are not drawn point to point as in other plotters and consequently, data must be stored and programmed to come out serially, one line at a time.

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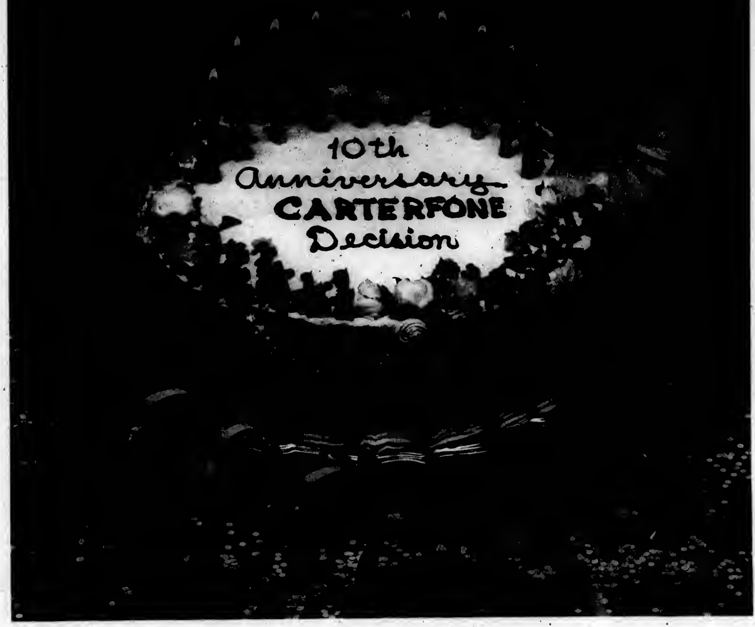


Develop Specific Plans for COM, Users Urged

Special to CW

BOSTON — Designing an efficient computer output microfilm (COM) system requires three essential elements: purposeful planning, careful data collection and thorough follow-through, according to Robert Ocon, a marketing vice-president with U.S Datacorp.

Addressing a group at the National Micrographics Association's convention here last month, Ocon stated that many project leaders responsible for developing a COM system for their organization err by failing to develop a "specific approach." COM systems design, Ocon stressed, is essentially a three-phase process involving planning, which encompasses the setting of specific objectives; involvement of key personnel; and finally, soliciting involvement by top management.

Saving money is probably the most common objective, in using COM, but many project leaders do not set a specific amount in hard dollars, Ocon said. The goal should be challenging enough that it will motivate people, but more importantly, gain the attention of cost-conscious senior executives who might otherwise ignore the project.

At least four groups of company personnel should be involved in COM development from the beginning. Representatives should include people from DP, systems, user and records management areas because they are the focal points of the data collection system, according to Ocon.

'Firing Up' Management

Several techniques exist to generate management enthusiasm and involvement but perhaps the most effective is the broad distribution of a letter or memo from a high-ranking company official. Such a message should point out the importance of the project, the executive's personal commitment and the need for organizationwide cooperation, Ocon explained.

After planning, the next phase is data collection, which generally includes compiling a list of all data processing reports, identifying potential COM applications, eliminating those applications that are inappropriate and preparing a special analysis of small reports and cost comparisons.

To maximize potential COM benefits, a prospective COM user should analyze all reports produced by the DP department — including reports for the DP department itself — to ascertain their suitability for COM, Ocon continued.

Some of the key information to consider, Ocon added, is the report title, frequency, pages per run, number of copies and pages per month.

To identify prospective COM applications, extremely large reports in the thousands of pages are an obvious beginning. However, Ocon stated, a report with as few as 500 pages per run or requiring four or more copies should also be carefully considered. The key elements to analyze are whether preprinted forms are used, what distribution method is used and how the reports are handled by users.

Annotation frequency, updatability and distribution to multiple users are also major considerations as well as whether queries are made by phone; whether copies must be mailed, how much research users do, whether reports are passed along from one department to another and what record retention requirements there are for internal, legal or tax purposes, Ocon pointed out.

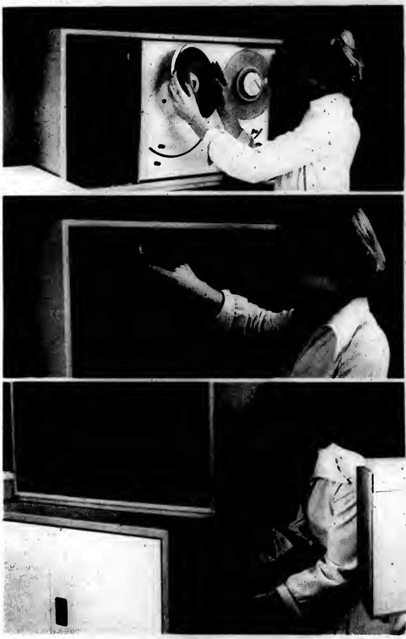
However, Ocon cited certain types of applications that should be eliminated from considerations.

- Applications that in themselves are turnaround documents.
- Those physically divided between individuals or divisions or in which data is confidential to some degree.
- Those with excessive annotations.
- Applications in which a hard copy has to go to the customer and only that copy is created.

Special Challenges

Small reports present some special challenges and are generally produced on a conventional printer because of the data's time requirements, Ocon said. Combining reports that are used among systems

(Continued on Page S/21)



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High Energy Density, Directional

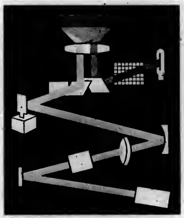
Laser's Features Make It Viable Print Medium

By Edward V. Ince
Special to CW

ROCHESTER, N.Y. — When used as alternatives to conventional writing instruments, conventional light sources such as tungsten filaments or arc lamps are wasteful since they emit their light spherically. When these light sources are used to illuminate the limited aperture of the usual optical system, only a small fraction of the emitted light is actually put to use.

Conventional light also contains many different wavelengths, sometimes requiring filters to control the spectral characteristics — but filters waste much of the originally available energy.

The laser, however, has many features that make it a viable alternative as a printing medium in computer output microfilm applications. First, the laser's energy is concentrated in a light beam that is relatively small to start with and which can be focused on an extremely small spot. This concentration results in a very high energy density.



Data recording is accomplished by advanced laser technology on a dry laser film.

Second, the laser is inherently highly directional so its energy is emitted in a unidirectional bundle without the need for elaborate collimating optics.

Third, the laser's energy is monochromatic, or of one wavelength. This characteristic combines with constancy of phase to define coherence. It is the quality of coherence that enables the user to manipulate the laser beam at accelerated speeds.

Basically, the user doesn't care whether information is recorded with a laser or a paint brush as long as the company's objectives are met. Along with these objectives, the user looks for both speed of output and, naturally, a low cost.

The laser, which operates via principles of deflection and modulation, was at first relatively slow because early units incorporated mechanical gadgetry, rotating mirrors and complex optical systems. Recently, however, research teams have discovered that the coherent properties of the laser make it uniquely qualified for manipulation at electronic speeds.

Many laser units today use an acousto-optic modulator which is a glass block attached to electronically driven transducers that send ultrasonic waves through the glass. When a laser beam is directed through the glass at an angle to the waves, the ultrasonic waves cause the beam to be separated, or diffracted, into a fan of nine beams that write the characters. The laser beam, in effect, becomes an electronic pencil of light, writing its data at electronic speeds.

Film choice is also an important consideration in laser printer technology. There is a definite relationship between any surface the user wants to make a mark on and the vehicle for making that mark. Generally, film responds to light much in the same way that paper responds to a pencil — if you press too hard with a pencil or use too light a stroke, the mark will be too dark with ill-defined edges or too light to read.

Similarly, too much light on film will cause overexposed, poorly defined images, while too little light produces an image too faint to be legible.

Varieties of Film

Films differ in several ways. One of the most important concerns is how much light needs to fall on the film to get an acceptably developed image.

The key to this lies in the size and the dispersion of light-sensitive materials (usually silver halide crystals) in the emulsion. The finer the grains, the less area each has to receive light and the more light it takes to make an exposure. Finer grain films offer a special advantage. If enough light is used to produce an acceptable image, finer grain films can record sharper characters than films sensitive to light.

Dry processing is also, from a user's standpoint, more desirable than traditional wet methods that require a darkroom and several chemicals. After the film is exposed, in a "dry" environment, the film image is developed in a dryheat process by passing it over a heated drum. The heat causes the recorded image to be amplified up to 1,000 times, resulting in both sharpness and clarity of the character image.

Ince is the director of product programs and photographic project coordinator for the Eastman Kodak Co.

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For Users Making Purchase Decisions

Independent Peripherals: More Than Cost Vital

Independent peripheral manufacturers are offering plug-compatible disk and tape systems at prices sometimes 10% to 15% below those of mainframe vendors.

Although cost is a crucial factor in user selection of a peripheral, there are others that should be taken into consideration.

These additional factors are discussed in the following excerpt from Auerbach Publishers, Inc.'s Input/Output Reports, *a three-volume reference on all facets of peripherals and data-handling equipment. The reference guide is updated monthly.*

Special to CW

Lower cost, equal and somewhat improved performance and flexible lease terms are the major incentives when considering conversion to plug-compatible replacements. Major factors to be considered, in addition to any price advantages, are the vendor's ability to support the installation, the equipment's design features and performance and the type of maintenance service provided.

Since IBM has the largest share of the marketplace, most vendors design their plug-compatibles as IBM replacements. The first step, for users of IBM equipment, is to re-evaluate their current installations and determine whether a simple conversion or a more substantial upgrade is needed.

Some users prefer to maintain a single-vendor installation. They remember the pitfalls that used to develop in multivendor installations. These users want to avoid the quibbling among vendors' customer engineers because their efforts to fix the blame for malfunctioning equipment can be tiresome and costly.

In the plug-compatible disk sector, however, these problems generally don't occur because independents and IBM's customer engineers usually don't disagree, particularly if the user receives his original disk system from IBM. In that case, IBM customer engineers will install the equipment and ensure that all hardware and software bugs are eliminated, simplifying the user's job of converting to a plug-compatible disk system.

Vendor Reputations

With increasing frequency, DP personnel are selecting their equipment on the basis of vendor reputation. The ingredients that determine a vendor's reputation are hard to define. In fact, two equally perceptive users may strongly disagree about the qualities of a specific vendor or his products.

However, there are factors that help a user to determine a vendor's stability and responsiveness to his customers' needs.

A user can gauge the past performance of a vendor by checking the length of time the firm has been in business. Presumably, an established firm has been providing satisfactory products to its customers and will probably remain in business and continue to provide service, maintenance and product upgrading.

However, a new product can have bugs even if introduced by an established vendor, so the user should know exactly when the product was first delivered.

As part of the investigation of a firm, the user should find out the location of the sales office, since a local vendor is more apt to provide better service. Since the vendor is not necessarily the manufacturer, the user would do well to investigate this point.

Also, a significant OEM market can be a plus factor in favor of the vendor. OEM business expands a manufacturer's production volume; lowers his costs and can improve his profitability via a more positive cash flow..

The electrical environment and facilities of the user's site are important considerations when choosing plug-compatible devices. Unless special circuitry and shielding are provided, electrical signals can be degraded when traveling

(Continued on Page S/18)

CRT Terminal. Together, they do a lot more than a

In fact, at $1795, it's like buying a top-quality printer and getting a terrific little CRT free.

And what a CRT! The Model 1100 displays 80 characters per line in an easy-to-read, 9 x 12 matrix and communicates at up to 9600 baud. Compare that to DECwriter III's puny 1200 baud.

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Clean. Quiet. Inexpensive. The Pussycat Printer and the Model 1100 CRT from Perkin-Elmer. Compared to a DECwriter III, they do more and cost less.

Mini, Printer Help Launch Publishing Venture

Special to CW

SAN FRANCISCO — A graduate student here used a minicomputer and a data communications terminal/printer to not only help him complete his Master's thesis but also form a fledgling publishing company as a result of his research.

Bruce M. Spence, manager of sales support for *Standard and Poors'* Fixed Incomes Systems, Inc. and a recent graduate of New York's Pace University, decided to alter the traditional process of preparing a Master's thesis, opting to forgo the reams and reams of note-taking and long hours at the typewriter. He streamlined the process of collecting a large volume of data, then took his thesis a step further, turning the project into a valuable resource book and at the same time establishing a company to publish his work.

Spence's book, *The Inside Source*, contains information on 26 contemporary, business-related fields. This includes everything from accounting, advertising and marketing to global economic development, international trade, transportation and urban development, Spence said. The book is actually an annotated bibliography of free publications on business, economics and management available from private and governmental sources.

Spence used a Hewlett-Packard Co. 3000 computer system, located in California, linked via the Telenet Communications Corp. network to a Diablo Systems, Inc. Model 1620 Hyterm terminal/printer stationed in New York. He then created a complete data base software system that enabled him to perform much of the research required for the book's compilation.

Spence, along with friends Joseph P. Adams Jr. and Peter deLucca, formed Quad International Corp. to market the book, and the group used the terminal/minicomputer arrangement to computerize the company's mailing lists, inventory control and accounting systems.

The terminal/printer and a modem were purchased by Quad International for approximately $3,500. According to Spence, "Diablo was terrific. Its representatives treated us with the same courtesy and helpfulness as they would treate any of their much larger customers.

"The Hyterm was central to the project. We not only used it as an I/O terminal, allowing us to access the computer system in California, but also made full use of its high-quality printing capabilities," he said.

"In fact, rather than spending $10,000 on typesetting, pasteup and camera reduction, we were able to use the Diablo 1620 to completely prepare the camera-ready copy from which *The Inside Source* was printed — some 500 pages of material."

The Hyterm is a microprocessor-driven data communications terminal that uses the Diablo Hytype II serial printer. The terminal features a variety of interchangeable daisy print wheels in different type fonts and is capable of letter-quality printing output at 45 char./sec.

"The Hyterm kept our total publishing cost for a first run of 1,000 copies of *The Inide Source* down to $14,000," Spence said. "By avoiding costly and time-consuming typesetting charges, we estimate that we saved roughly $6,500. Probably more important, in terms of cost, was the amount of man-hours and clerical expense saved by using the terminal to prepare personalized letters necessary both in the compilation and marketing stages of the project."

Working evenings and weekends for a year and a half, Spence, Adams and deLucca combed libraries and sent out more than 600 letters, printed on the terminal, to po-

(Continued on Page S/21)

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'Very Rarely' Go Down

Disk Replacements Please Programming Firm

By Howard A. Karten
CW Staff

NEW YORK — How do you attach a 3330 disk to your IBM 360 when IBM doesn't supply the necessary software? Mike Parrella, president of Decision Strategy Services Corp. (DSS) here, turned to Itel Corp. to do the job and, after using the Itel 3330 replacement for 18 months, is pleased with the result.

Parrella's company does contract programming for other businesses, concentrating exclusively on on-line applications. In addition, the firm operates a 370/145 which runs several on-line systems for clients. The applications on the system include order entry, accounts receivable, data collection and data query.

Best Deal

When Parrella acquired his 360/50, he wanted to run 3330 disks with it. In addition, he knew he would eventually be converting to a 370. "I looked at Itel and other vendors, and Itel's cost and abilities seemed 'most competitive," Parrella said. "I had heard many good things about Itel hardware and software, and I wasn't disapponted."

Discussing the performance of the Itel disks, Parrella commented that he had some minor problems with the disk control unit at first, ". . . but once [Itel] got it straightened out, the units performed very well. It's very rare for a disk to go down now."

He also feels Itel support is excellent. "They respond immediately when I put in a call," he said.

DSS specializes in developing on-line systems for clients and pays for its 370 by running some of these on that system. Most of these applications run under a software package developed by DSS called Terminal Applications Processing System, or Taps.

The company's equipment complement presently includes the 145 with 256K bytes of IBM memory and 768K bytes of Itel memory, Itel 3420-compatible tapes, two 1403 printers, an IBM 2540 card reader and a Memorex Corp. 1270, which emulates an IBM 2701. The company runs Release 34 of DOS/VS, using a 3270 as a console.

The equipment presently operates 24 hours a day, seven days a week, and runs five partitions. Parrella is planning to increase this to seven in the near future.

DSS is pleased enough with Itel's performance to be considering installing an Itel AS/4 to replace its 145. "We're practically an Itel shop now," Parrella note.

Parrella spoke enthusiastically about Itel's service. "I'm a very small guy, relative to the rest of the world, and when I have a problem, the Itel people are all over me. They follow my business, and as it grows they offer migration paths and suggestions to increase my machine capabilities.

"My salesman always keeps an eye on me to make sure my equipment meets my business needs. Itel is much more receptive than most other companies as far as the little guy goes."

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MOORE BUSINESS FORMS, INC.

Plotter Speeds Job Turnaround For Builders

(Continued from Page S/7)

that would be very difficult for an engineer to do.

"Traditionally, a truss design took several weeks and involved a number of people so there was a greater opportunity for error. A salesman would go to the construction site, take down the job specifications and mail them to the truss designer," Naurison explained. "Then an engineer would design the roof or floor truss using code books and calculators. The finished drawings and specifications would be returned to the builder weeks later."

No On-Site Visits

With the computer-based system, the on-site visit is eliminated and engineering and drafting can be done in minutes. In addition, much of the time-consuming research is avoided since the computer has most of the information stored in memory. "Our engineers simply feed in certain criteria and the computer analyzes the available data to arrive at an answer," Naurison said.

In addition, the system has provided cost benefits for customers. "We are able to determine the most efficient and economical use of materials, thus eliminating waste," he stated. "And the speed with which we can do the drawings and the volume of designs we handle, together with the lower costs for our truss plates (manufactured in large quantities) mean major savings for our customers."

Naurison believes that many of his customers are persuaded to do business with him because of the plotter itself. "When a prospective customer comes in, the first thing I show him is our plotter. These people are professional, and they're astounded when they see that machine operating. I've never seen a prospect come in here who hasn't been sold once he's seen the plotter."

With the Kodak laser printer, film is cheaper than paper.

Consider the operating cost of the Kodak laser printer versus the operating cost of a paper-impact printer.

Consider, for example, the cost of generating a 1000-page, 3-copy report.

Three-part stock paper costs about $22.30* per 1000 pages. But you can put the same report on microfiche for around $1.50.

So, from the standpoint of materials alone, paper is about 15 times more expensive than microfilm.

Time and labor costs are important factors, too. Especially in a DP department. Which is why you should know that it would take almost 50 minutes to decollate, burst, bind and package a 1000-page report. It would take only 9 minutes to print, duplicate and package the same report on just 4 microfiche.

A Kodak laser printer can save you money in other ways, too. With a paper printer, you'd have to load at least 12 boxes of paper to print the equivalent of one cartridge of 16-mm film. Compared with fiche, the margin of difference is even wider. You'd need 31 boxes of paper to print the equivalent of one fiche cartridge.

87% cheaper.

In fact, when you add up the savings in materials and labor, you'll find that printing with a Kodak Komstar laser printer is about 87% cheaper overall than printing with a paper-impact printer.

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The printers that print without paper.

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*Prices vary with geographic location and grade of paper purchased.

Independent Peripherals: Cost Not Only Factor

(Continued from Page S/14)

through extended lengths of cables.

For this reason, IBM requires contiguous portions of floor space for all components in its direct-access storage facility (DASF) disk systems. Some independents don't follow IBM's policy in this regard because its cabling restrictions also prevent customers from using the various nooks and crannies that might otherwise be filled with an individual drive module or a controller.

Special operating and maintenance hardware features should also be considered by the user. Does the equipment include both operator and maintenance panels?. Where are they located? What special switches and indicator lights are provided to aid the user in operating the system and the customer engineers in maintaining it?

By definition, plug-compatible replacements should be the logical equivalents of their original counterparts. Still, it's a good idea to check whether there will be a need to modify existing hardware or software before installing and operating the equipment.

For instance, some dual-density packs can organize data somewhat differently from single-density packs; minor software modifications may therefore be required.

Also, some dual-density disks require modifications to the IBM OS and DOS operating systems and others necessitate careful data organization to prevent performance degradation. Generally, the vendor is responsible for any required system modifications.

Independents offer a wide range of performance characteristics related to the disk drive's mechanical motion. Differences are generally found in such features as moving-head repositioning time, effective data transfer rate and disk start/stop time.

Whether these performance variations will impact a user's operation depends on the system type and level of activity. For example, if the installation is operating at full capacity, then increased data transfer rates can improve system throughput.

Although the same bit density and rotational speeds give the same peak transfer rate, reduced access times result in more data actually transferred to the CPU in a given time period. Start/stop times can become significant for installations where disk packs are frequently changed.

If a substantial amount of disk usage involves random file access applications, drives with shorter moving-head repositioning times can handle files more efficiently.

Most plug-compatible manufacturers offer a variety of pricing arrangements. The optimum price can vary, but it reflects a balanced mixture of lease duration, maintenance and overtime terms and cost.

Short-Term Leases

Short-term leases benefit users who decide to cancel in favor of more technologically advanced or less expensive equipment, because there is no penalty. Short-term leases can also be advantageous for users who want to operate a plug-compatible vendor's equipment on a trial basis.

On the other hand, short-term leases are usually more expensive, and the user is subject to more frequent price changes if he renews his lease during each short-term interval.

Long-term leases involve small monthly payments but extended commitments on the part of the user. The user is protected against price increases, but also prevented from taking advantage of any price decreases.

Maintenance is usually included in the lease price, but maintenance hours vary and the price changes accordingly. The customer generally pays higher maintenance fees for service outside the normal five-day, 40-hour working week and, unfortunately, the normal working week is "prime time" for most computer installations.

This results in a trade-off decision: Should the user pay for on-call maintenance during hours that won't interrupt the installation's activity, or should the user pay a smaller maintenance fee and risk system downtime during the most productive hours?

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Now, notice the 640-character FIFO buffer. It channels data so

Despite Variety of Devices

Ultimate Hard Copy Solution Not Yet Offered

By Tim Scannell
CW Staff

BOSTON — Although there are a variety of digital hard-copy devices available to the user — electrostatic, thermal, ink-jet, xerographic, film and conventional impact printers and pen plotters, none appear to be the ultimate solution for all applications, according to Alan Dawes, a representative of the Versatec Co.

"In order to satisfy the varied needs for hard-copy devices, two techniques have been developed," Dawes said at a recent conference here. The first is "a concept of image dissection" and the second is "the writing technique itself, of which there are several."

Image dissection, Dawes explained, is the process used by both nonimpact and some impact devices to achieve a "versatility of display. The image to be displayed, such as letters or graphics, is dissected into a number of common elements" called dots.

These dots are selectively positioned "in a fashion similar to a television display, where the scanning beam is turned on and off, producing the desired image when the eye integrates the detail," Dawes said.

Resolution, although previously a problem with earlier devices, now "approaches the look of a typewritten page" with displays as dense as 200- to 300 dot/in., Dawes added.

In the area of writing techniques, one particular process — electrostatic writing — is believed to hold "extraordinary promise" because of its inherent simplicity, Dawes said.

Electrostatic writing devices employ a conductive paper coated with a dielectric film a few microns thick. "Its major function is to retain an electric charge," Dawes explained.

The paper is passed between a conductive stylus and an electrode that charges the surface of the paper. Then, "using a recording head which contains an array of embedded nibs, and addressing those nibs in the appropriate manner, one can selectively deposit charged dots on the surface of the dielectrically coated paper," he said.

The electrostatic disturbance remains invisible until toner, a developing solution composed of a suspension of carbon particles, is applied to the paper's surface. "The black (carbon) particles migrate to the charged areas, where they are deposited and permanently fixed as the paper dries," Dawes said.

The advantage of using electrostatic-type printers or plotters over devices that employ another printing technique is that these machines, because of their method of image dissection, can display any kind of graphic and alphanumeric information.

"This has become very useful where different languages have to be written by the same machine and where dense black areas, plus fine-line graphics, are required," Dawes pointed out.

Thermal printers also use treated paper, but their resolution is usually limited to less than 100 dot/in. "Total versatility of display is possible by exploiting image dissection and imaging with one writing element," Dawes said.

Because the heads of the printer can be positioned across the page, this type of machine is ideal for use as a "low-cost, 100 char./sec serial printer."

Ink-Jet Printing

"The most important benefit of ink-jet types of printing devices is their ability to write on any substrate — from letterhead bond to carpets," although "reliability at a reasonable cost has yet to be proven," Dawes stated.

Synchronous systems print characters by "selecting ink droplets from a continuous stream" at about 100,000 droplet/sec, but asynchronous machines are considerably slower (approximately 20,000 droplet/sec) because the imaging is produced by a "drops-on-demand" system.

High speeds are possible with multiple ink-jet heads,

(Continued on Page S/21)

the 820 KSR. with more impact.

it's printed at maximum efficiency, either uni-directionally or bi-directionally. And the buffer provides overflow protection so you won't lose any input.

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Printer Allows Flexibility in Traveler Badges

Special to CW

DAYTON, Ohio — Name badges are a small but important ingredient of travel incentive programs various companies offer their employees.

A firm here, recognizing the need for a viable yet economical means of individual identification, developed a computerized name badge printing system based on a label preparation system (LPS) offered by the Standard Register Co.

Badges are included in each traveler's information packet.

The E.F. MacDonald Co. administers incentive programs for more than 3,000 companies throughout the country. This involves making all the necessary arrangements and providing the materials for more than 250,000 people who have received travel as a reward for outstanding achievements in selling, production and other areas, a spokesman said. Unfortunately, the name badge has been a "nagging headache" for the firm.

Typewriter Limitations

First of all, the company was limited to what a typewriter could do — print in one type size that was usually too small for the badge's purpose. At the same time, company officials were looking for a badge that would adhere to any fabric without doing damage and that would last a reasonable length of time, the spokesman stated.

In most cases, the company prepared six badges for each person participating in an incentive travel program. The badges formerly came on sheets and were imprinted with colorful information identifying the company and the trip's locale. A typist produced the badges by typing information on a master typewriter while a slave typewriter would generate five more automatically.

Several Production Steps

The computerized badge printing operation, however, is actually composed of several production steps which begin when a customer sends in a list of people scheduled to take a trip.

The lists of people are first keypunched, processed by an IBM 370/145 and input to a data base containing all the necessary information about the trip and the trip's destination. This information consists of a list of functions to attend, currency data, information about passports (if needed) and so on, as well as the details needed to produce the name badges, the spokesman continued.

The complete "pretrip" information is then accessed from the data base, along with the individual's personal data, and output to magnetic tape. The tape is then used, the spokesman said, to prepare a deck of cards — one for each person on the trip list. The punched cards serve as the source for the LPS name badge printing operation.

Card Reader

The deck of cards is placed in a 200 card/min reader, which transfers the information to a Standard Register badge printer. The printer is loaded with one-part continuous forms consisting of blank labels mounted three-wide on a carrier sheet, the firm noted. When only one badge per name is required, the company uses a one-wide format, although this is infrequent, the spokesman added.

Card reader (at top) feeds information from tab cards to printer, which produces pressure-sensitive labels on continuous forms.

The system is not only fast but it provides a great deal of flexibility in imprinting badges, the spokesman stated. The system has, for example, two basic formats, each having four lines of type. The difference is that the first line of one format has .4-in. type and on the second format the first line is .2 in.

Within the two formats, there are also six location styles consisting of name, home city and state and other variable items which can be entered on the first three lines. The last line, if used, is for an item that is constant, such as a short phrase describing the trip's theme.

In addition to the type size variety and layout style, the spokesman said, the system also allows the inclusion of nicknames, if desired. This was not possible with the typewriter operation.

After the badges are imprinted with the information, the continuous form is separated into sheets and sent out to have decorative material such as company logo and name, trip location and so on, imprinted on each one, the spokesman pointed out.

While cost was not the determining factor in the company's decision to change procedures, it has realized savings, the spokesman claimed. More importantly, the readability problem has been solved for all concerned.

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Mini, Printer Help Grad Move Into Publishing

(Continued from Page S/15)

tential information sources thoughout the country. Once they had gathered their data, the fed it into the computer system for processing, indexing and cross-referencing. The collated bibliographical entries were printed out on the terminal and the printout sent to an outside print shop for production and binding of the book.

Marketing Aid

As part of its marketing effort, Quad also used the terminal/printer to produce more than 500 press releases and personalized cover letters to announce the publication of its book. According to Spence, "Because the Hyterm can handle up to 12 different forms lengths, we were also able to save a lot of time and trouble by storing our mailing lists on the computer system, then writing a simple program to print out the appropriate envelopes on the terminal.

"In one weekend, we printed more than 300 cover letters and envelopes. And the print quality was so good that each one looked as if it had been individually typed by a secretary," he said.

Since the book's publication in late 1977, Quad has distributed more than 600 of the original 1,000 copies produced. "If there is a continuing- demand," Spence explained, "we are confident of being able to bring out subsequent, annually updated versions of the bibliography . . . utilizing the printer and the minicomputer."

Quad International, which began as a graduate school research project, is currently undertaking a new task — a major readership demographic study for a leading national magazine.

"We'll be surveying more than 35,000 individuals scattered around the country. "Quad is designing the computer data base and software systems to handle the questionnaires and to process the responses to them into coherent, useful media market profiles," Spence explained.

"Again, the terminal/printer will be used to prepare all our forms for mailing and to print out the ultimate report. And for a $3,500 investment in hardware, Quad is getting an awful lot," he said.

Specifics Needed for COM

(Continued from Page S/12)

personnel can help limit excess material and if that is not possible, certain software will permit multiple reports to be placed on a single fiche.

Compare Economics

In order to satisfy the main objective of cutting costs, project leaders should compare all the economics of their old system and the proposed microfiche system. An application worksheet that incorporates not only paper, but print time, storage and paper handling costs is a necessity if the complete cost picture is to be seen, Ocon stated.

After selecting the appropriate applications, users should select the right microform, choose proper reduction ratios, decide on indexing needs, develop a conversion timetable and, of course, train users.

There is little question that microfiche, as opposed to 16mm and 35mm film, is best suited for DP reports because of its ability to be retreived quickly, its reasonably small size and the possibilities for visible indexing, Ocon observed.

In the area of reduction ratios, the higher the better, Ocon said. While 24X fiche contains 80 pages of data, a 72X reduction permits up to 690 pages of data plus indexing to be stored on a single 4-in. by 6-in. piece of film.

Explore Software

Software that offers indexing flexibility and thereby enhances the use of the applications and increases efficiency should be carefully explored, Ocon noted. Eye-readable indexes should only use enough characters to permit fiche and column selection, and report titles should be meaningful to everyone in the corporation — not just the DP department.

Conversion schedules should be specified in advance and followed, Ocon declared. All too often, he stated, a few applications are converted and then the conversion schedule begins to slip. This results in wasted effort and, more important, wasted time, he emphasized.

Finally, a great deal of emphasis should be placed on user training. Without proper training, Ocon explained, all the time spent looking at applications and collecting data is lost if a clerk does not know how to use the film or where to store it.

Ultimate Solution Not Yet Offered

(Continued from Page S/19)

although such devices "are expensive and of uncertain reliability," Dawes said. However, ink-jet systems can produce color characters and continuous tone images by modulating the droplet size.

Electrophotographic systems dissect the images and reconstruct them in a digital dot matrix form, Dawes said. These machines "have the potential to merge graphics with text . . . and their graphics capability is oriented toward forms creation and special characters.

"Conceptually," these types of printers "could reproduce highly versatile graphics," he added.

Photoplotter's Benefits

Photoplotters, which utilize film, tend to be expensive and serve specialized applications such as data logging and seismic plotting. "Their advantage is speed and an ability to create variable-width, dense black areas," Dawes said. "Film is also used extensively for capturing digital images from CRT displays."

Impact printers "offer a means to create plots for the occasional graphics user unable to justify the cost of a plotting system," Dawes said. "Many simple business graphs, bar charts, scatter diagrams and so on can be produced on low-speed daisywheel printers."

Finally, pen plotters, although very slow, "are highly accurate and can write on a variety of substrates."

In the long run, the machines that will be most accepted by users will be those that are simple to operate and "most versatile in rendering information visible," Dawes observed.

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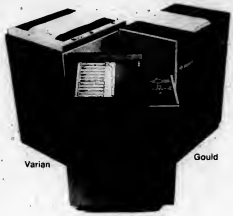

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No Agreement on Definition

No Real DDP Systems Seen Being Sold

By Howard Karten
CW Staff

ANAHEIM, Calif. — No vendor is presently selling true distributed data processing (DDP) hardware and software.

That is one of the startling conclusions reached by a group of panelists at the recent National Computer Conference here.

Defining DDP as "a collection of processing elements, interconnected both logically and physically with decentralized, systemwide control of resources for cooperative execution of application programs," Dick Eckhouse of Digital Equipment Corp.'s Research and Development Group said he sees four key answers to the question "Why DDP?": reliability, extendability, conformability/adaptability and applications performance.

In his jocular presentation, Eckhouse discussed several concepts and pieces of hardware which he said are "not DDP." Among these, he said, are multiprocessing, computer networking, intelligent terminals and satellite processors.

There is little or no agreement on the meaning of DDP, he added, but there are nevertheless some key DDP questions to be asked. Among these are how the data is distributed and how error handling is performed.

An additional, important issue, he said, is the question of "how we can use the inaccurate or missing information to perform optimal resource allocation." This question, in turn, points to some research directions in DDP, such as synchronization, availability and load balancing.

Drawing a distinction between the uses of data processing in the past and in the future, David J. Farber, professor of electrical engineering at the University of Delaware and chairman of the panel, said, "The older notion of economies of scale of larger systems is just not a factor of modern economic life" with computers.

"In the 1950s and '60s, with centralized DP operations, the organizations had to adapt to the needs of the computer, which produced a great strain in organizations. Distributed systems put power back in the hands of those who need and use it," Farber said.

Although this view seemed to be somewhat conjectural, given the agreement among panelists that no true DDP hardware is currently being sold, Farber nevertheless went on to caution that much higher reliability and availability of equipment is needed than currently exists before DDP can be embraced as a panacea.

Cautioning attendees that technological issues are merely one aspect of distributed systems, Farber suggested that social impact statements on such systems be required before they are installed, as environmental impact statements are now required for construction projects.

Adding to the heavily academic flavor of the panel, E. Douglas Jensen of the Honeywell Systems and Research Center of Minneapolis said he knows of "no publicly announced software" that meets his definition of a distributed system — that is, a system in which the software as well as the hardware is distributed.

Seven-Color Xerographic Printer Works on Both Originals, Input

NEW YORK — A color xerographic printer capable of producing graphics from either original material or digital input has been introduced by Xerox Corp.

The Xerox 6500 can reproduce material in seven colors at a rate of 192 document/hour, company officials said.

Presently only one device — the Ramtek Corp. Model 6200A terminal — is capable of being interfaced to the 6500, the Xerox spokesmen said, but Ramtek is currently working on interfaces for its other color graphics terminals.

Two other vendors, Aydin Corp. of Ft. Washington, Pa., and Chromatics Corp. of Atlanta, Ga., are also developing interfaces, they added.

Company officials said many companies had expressed interest at the recent National Computer Conference in interfacing the 6500 directly to a mainframe, but they know of no one actually planning to produce such an interface. The unit is clearly intended to compete in some fashion with the color plotters now available, however, since it is said to be TTL- or DTL-compatible, with synchronous operation of 400 scan/sec and an image resolution of 100 point/in.

The colors available with the unit — cyan, magenta, yellow, red, green, blue and black — can be printed on either plain bond paper or suitable transparency material using a laser-recording process on a raster-type image, one spokeswoman said. The maximum dimensions for conventional photocopy are 8.5- by 13.75 in., she added, while maximum dimensions for digital input are 6.4- by 13.75 in.

The printer is priced at $25,000, with first deliveries scheduled for August. No leasing plans will be offered, Xerox said from 280 Park Ave., New York, N.Y. 10017.

Voice Synthesis System Updated

TROY, Mich. — The Votrax Division of Federal Screw Works is offering an updated version of its Model VS-6 vocal synthesis system that reportedly features improved voice quality.

The Votrax VS-6.4 has a first-in/first-out (Fifo) buffer and comes with either a serial or a parallel interface, according to a spokesman. It interfaces with any computer, requiring a speed of 300 bit/sec in Ascii (with serial interface) or 150 bit/sec (parallel) to generate continuous-sounding speech.

The system produces human-sounding speech by combining phonemes, which are used as the basic elements of speech. The phonemes, combined in response to digital information presented to the unit, are integrated with inflections to produce an unlimited vocabulary, the spokesman explained.

The Votrax VS-6.4, which meets RS-232 standards, sells for $5,955. Users of VS-6 can upgrade to a VS-6.4 for $1,500, the company said from 500 Stephenson Highway, Troy, Mich. 48084.

Printer Runs at 900 Line/Min

MALDEN, Mass. — Data Printer Corp. has introduced a 900 line/min printer featuring 8080A microprocessor control and single-line memory buffering.

The Model 1290 has 132 print positions with 10 position/in., a paper slew rate of 20 in./sec and motorized tractor control for forms handling, according to a spokesman. A vacuum cleaner system, paper puller system and electronic vertical format unit are available as options.

Vertical forms control for the unit is 8-channel, with 1 in. paper tape, and includes automatic single- or double-line spacing. Line feed of 0 to 63 lines under program control is also standard.

The Model 1290, which uses the company's Chaintran method of printing, is available for $13,700 from Data Printer at 59 Middlesex St., Malden, Mass. 02148.

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Data 100 Extends Options For Disk-Based Data Entry

MINNETONKA, Minn. — Data 100 Corp. has announced a disk-based system for data entry users that the company said bridges the price/performance gap between disk and diskette-based systems.

The system, called the Model 77-107, comes with 32K bytes of storage and features a control unit with 2.5M bytes of disk storage, one or two CRT keystations with typewriter- or keypunch-style keyboards and synchronous communications up to 9,600 bit/sec.

Optional peripheral equipment for the system includes printers ranging in speed from 62- to 1,250 line/min, card readers ranging in speed from 150- to 1,000 card/min and 9-track, 800- or 1,600 bit/in. magnetic tape drives.

Data 100's Keybatch software package has been updated to include concurrent IBM 2780, 3780 and Hasp communications capabilities, the company said. In addition, a 3780 emulator is offered with the system that reportedly supports auto-answer abilities for unattended operations.

The Model 77-107 with one CRT, the communications software, a 62 line/-min printer and 2.5M bytes of storage leases for $679/mo on a one-year lease including maintenance: it sells for $23,286.

Data 100 is at 6110 Blue Circle Drive, Minneapolis, Minn. 55435.

High-Speed Core Memory Comes on One Planar Card

WOODLAND HILLS, Calif. — A 128K-word by 18-bit core memory for minicomputer and mid-scale computer applications requiring a large storage capacity and high speed has been announced by Dataproducts Corp.

The memory module, which the company is calling the Maxi-Store, is said to feature a 750 nsec cycle time and 325 nsec access time. It is expandable to 1M word by 18 bits.

The Maxi-Store uses a three-wire, three-dimensional organization on a self-sufficient planar card containing address and data registers and timing and control logic, he added. It requires only +5 Vdc and +15 Vdc for operation, he noted.

A 19-in. chassis 10.5 in. high can house up to four of the modules, power supply and an extra slot for either a self-test card or a customer interface card. The power supply for the unit is contained in the chassis the spokesman said, and optional chassis wiring permits either a 36-bit double-word configuration or daisychaining to connect two chassis (eight cards) for the 1M-word configuration.

Prices for the Maxi-Store begin at about $36,800 for a 1M-word module, the spokesman said from 6219 Desoto Ave., Woodland Hills, Calif. 91364.

Band Printers Offered to OEMs

LEXINGTON, Mass. — NEC Information Systems, Inc. has introduced a series of 300- and 600 line/min band printers for OEM users that feature microprocessor control and extensive use of LSI circuits.

The printers, designated the L300, the L600 and the L250G, are said to have typical throughput rates of 300-, 600- and 300 line/min, respectively. In addition to its normal 300 line/min. operation, the L250G offers a 15 char./in. compressed print capability and 720 point/sq-in. graphics capabilities.

The steel-print band units feature 136 print positions, operator-selectable forms lengths from one to 99 lines, operator-selectable single- or double-line feed and a test print switch.

Electronic vertical formatting control, an audible operator alarm and a slew rate of 15 in./sec are also featured.

An original and up to five copies can be produced on paper ranging from 6- to 18 in. in width, using a choice of font styles in Ascii character sets of 48-, 64-, 96- and 128 characters.

Interfaces available on the units are said to offer compatibility with Centronics Data Computer Corp. and Dataproducts Corp. equipment, as well as RS-232C equipment.

OEM prices are approximately $3,200 for the L300, $4,200 for the L600 and $3,400 for the L250G. The firm, at the U.S. subsidiary of Japan's Nippon Electric Co., is located at 5 Militia Drive, Lexington, Mass. 02173.

Tape Accommodates 6,250 Bit/In. Drives

SANTA CLARA, Calif. — Memorex Corp. has introduced a high-density magnetic tape designed particularly for 6,250 bit/in. tape drives.

The tape, which the company is calling Cubic HD, comes on the company's Superreel computer tape reel. The one-piece, I-beam hub reel handles the operating stresses encountered in 6,250 bit/in. drives, according to a spokesman.

The chief reasons for tape failure on high-density drives are edge damage and tension stress, the spokesman said, claiming the Cubic HD overcomes these problems.

A sealed, 2,400-foot reel costs $24.50. Memorex is headquartered at San Tomas & Central Expressway, Santa, Clara, Calif. 95052.

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Interactive Graphics Unit Runs With 360, 370

BOSTON — A two- or three-dimensional interactive graphics unit plug-compatible with IBM 360/370 channels and available in black and white or color has been introduced by Adage, Inc.

The Model 4370 graphics peripheral consists of a channel control unit, display control unit and 21-in. CRT. Each channel control unit is reportedly capable of supporting four display control units, each of which can support as many as four CRTs.

The device incorporates an Advanced Micro Devices, Inc. AMD 2901 microprocessor and read-only memory control storage and has a transfer rate of 3M bit/sec, or 1.5M bit/sec if the CRTs are remotely connected to the display unit by dual coaxial cables. Cable runs of up to three miles are supported, the company said.

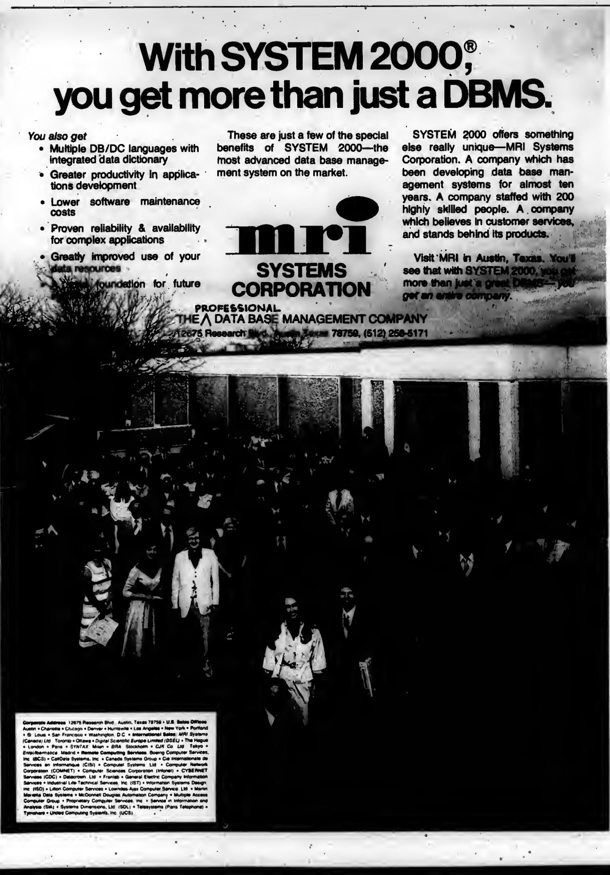
System Features

Features of the system include hardware windowing, 128:1 zoom, depth cuing and the ability to connect other support devices including a joystick, trackballs or digital data tablet. In addition, a four-color (red, orange, green, yellow) CRT unit and a hardware circle/arc generator are offered as options, Adage said.

Hardware and firmware in the graphics unit are used to process channel protocol, error checking and data/-command buffering, a company official said, adding that the device reduces the burden on the host 360/370 by performing all image manipulation and interrupt handling normally required for interaction with two- or three-dimensional images.

A Model 4370 with four CRTs costs $134,000, according to the company, while a 16-CRT version is available for $472,000.

Four color beam penetration CRTs are also available for an additional $18,000 per CRT, and the three-dimensional hardware windowing feature, part of the display control unit, sells for $7,500. Initial deliveries are scheduled for the first quarter of 1979, the firm said from 1079 Commonwealth Ave., Boston, Mass. 02215.



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Mini Bits

Course for First-Timers Teaches Computing ABCs

WOODLAND HILLS, Calif. — First-time users of small business systems can reportedly prepare for their introduction to computing by taking a self-instruction course from Info 3.

Entitled *"Computer Concepts for Small Business,"* the course tells DP novices how to process various types of data, how to evaluate and select hardware and software and how to implement a successful installation, according to Info 3 officials.

It also presents the requisites of sound business computer applications and covers systems operation including critical management concerns like security and personnel staffing decisions, they said.

Instructional materials include more than two hours of audiocassette tapes and a workbook with more than 200 pages. Through July 15, the course costs $95; thereafter it is priced at $140.

In addition, a chart outlining course objectives is available from Info 3 at Suite 193, 21242 Ventura Blvd., Woodland Hills, Calif. 91364.

Off Your Chest

Many users and industry officials have worthwhile things to say to their colleagues but are seldom heard because they lack an appropriate forum.

If you're one of those individuals, here's your chance to get those important opinions off your chest and out into the world where they can do some good. *Computerworld* is now seeking reader contributions for its August "Special Report on Minicomputers and Small Business Systems."

Maybe you're a user who found an ingenious small systems solution to a crucial business problem or who has an unusual installation experience to relate.

Or perhaps you're a company official with industry tips or prognostications that users should know about.

If you have something interesting to say on the subject of minis or small business sytems, CW wants to hear from you — and so do nearly 90,000 CW readers.

Contributions should be four to eight double-spaced, typewritten pages long and should be submitted no later than than July 20 to Jeffry Beeler, *Computerworld*, 797 Washington St., Newton Mass. 02160.

Randal Data Systems Link 240

Randal Link 200 Additions Boast 60% More Power

By Jeffry Beeler
CW Staff

TORRANCE, Calif. — Two additions to Randal Data Systems, Inc.'s Link 200 series of cartridge disk-based business systems provide mass storage units 60% faster than those previously available with the 200 family, according to a Randal spokesman.

Both the Link 240 and Link 250 use hard disk systems that rotate at 2,400 rev/min and transfer 537k byte/sec, he said. The earlier members of the Link 200 line, by contrast, incorporate 1,500 rev/min disk units that transfer 336k bytes/sec.

Randal credited the increased disk system speed with giving the link 240 60% greater throughput than the Link 206 system it replaces. The Link 250, in turn, provides twice the processing power of the 240, at least in preliminary benchmark tests, the spokesman said.

Randal compared the 240 and 250 in performance to the Digital Equipment Corp. PDP-11/34 and to some of the small business systems from Basic/Four Corp., Qantel Corp. and Wang Laboratories, Inc.

Both additions to the Link 200 series are reportedly hardware- and software-compatible with the Link 500 family at the

(Continued on Page 54)

Several Systems Later, User Cuts Hardware Costs With Mini

By Jeffry Beeler
CW Staff

BOSTON — Spending for in-house DP hardware has dropped from $8,200/mo to $2,700/mo at Hub Mail Advertising Service, Inc. here since the direct mail firm installed its latest DP system.

Hub Mail officials also credited the small business system with helping management isolate the source of earnings losses and evaluate the sales representatives' productivity.

Achieving these benefits, however, didn't come easily for the firm, which maintains mailing lists and performs related functions like creative mail marketing and inquiry fulfillment for 750 customers including nonprofit organizations, manufacturers, retailers and service firms. Before settling on its current system, Hub Mail experimented with a succession of computing alternatives ranging from time-sharing to large in-house systems, none of which completely satisfied its DP needs.

Since installing its latest system, Hub Mail has automated most of its standard accounting functions as well as a program for evaluating sales leads, according to the company's president, Wally Bernheimer. The firm is considering automating several other applications, including a data collection system that could allow Hub Mail to dispense with employee time sheets, Bernheimer said.

Hub Mail first became a DP equipment user in 1964 when the U.S. Postal Service's introduction of Zip Codes forced the company to revamp and reorder all its mailing lists. To accomplish this feat, it acquired an

(Continued on Page 56)

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TI Cuts Prices

HOUSTON – Texas Instruments, Inc. has cut memory costs for its 990 minicomputer and microcomputer line. All parity memory modules for the firm's 990/10 minis now cost 10% less than before, while prices of 990/10 error-correcting memory have dropped an average of 26%, according to a spokesman.

For example, a 64K-byte error-correcting memory that formerly sold for $3,936 now costs $2,880.

For the company's 990/4 microcomputers, memory prices have dipped an average 15%, with larger modules showing the greatest reduction. Prices of 40K-byte parity memories, for example, have shrunk from $1,600 to $1,240, while the cost of 8K-byte modules has fallen from $400 to $368.

Also Gains Dual-Port Option

Ampex Core Add-On Now Fits Eclipses

EL SEGUNDO, Calif. — Ampex Corp.'s Megastore 1223 can now operate with Data General Corp. Eclipse minicomputers as well as with the CPU manufacturer's Nova line, according to an Ampex official.

The auxiliary core memory unit has undergone enhancements that make it compatible with Eclipses equipped with the Model 4019 controller and DG's Real-Time Disk Operating System, the spokesman said.

The Model 1223 also comes with a dual-port option that for the first time allows the unit to operate with two Novas or Eclipses, he added.

Equipped with a built-in controller, the core memory unit stores 512K to 4M bytes and transfers a 512K-byte block of data in 1.8 msec, Ampex said.

The dual-port option, meanwhile, reportedly minimizes user waiting time by alternately transferring data a word at a time through its two ports.

A 1M-byte Megastore 1223 costs $21,430, with the dual-port option an additional $1,300. Both are available from Ampex at 200 N. Nash St., El Segundo, Calif. 90245.

Additions to Link 200 Line Boast 60% More Throughput

(Continued from Page 53)

upper end of Randal's business systems line.

The 240 and 250 differ from each other primarily in main memory and operating system, the spokesman explained. While the 240 incorporates a single-partition memory and uses a time-sharing operating system, the 250 provides a memory with up to 10 partitions and uses a Randal Time-Sharing Operating System II (RTOS II), a partitioned package previously available only to Link 500 users.

In a minimum configuration, the 240 reserves 7K bytes of its 32K-byte main memory for user programs, the Randal source said. As the hardware is upgraded, more and more of the operating system becomes resident in memory; by the time the CPU achieves its full capacity of 64K bytes, the operating software resides completely in main storage, he explained.

As a result, users of larger 240 configurations do not have to access their disk to retreive a portion of their operating systems, the official added.

In a 48K- or 64K-byte configuration, the 240 reportedly reserves 15K bytes of its main memory as applications space and supports as many as 16 time-sharing users. However, for heavy data entry applications involving 4,800- or 9,600 bit/sec CRT terminals, the practical number of users supported simultaneously by the system is five, the spokesman said.

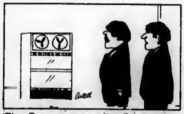
Like the 240, the 250 theoretically accommodates up to 16 users, but because of the partitioned memory and RTOS II software, its practical limit is said to be 10 users.

Identical in hardware to the earlier Link 200s except for its faster disk system, the 240 in its minimum configuration incorporates a 32K-byte CPU, a 10M-byte disk unit with a 5M-byte fixed platter and a 5M-byte removable platter, a CRT terminal and an 80-column, 110 char./sec printer.

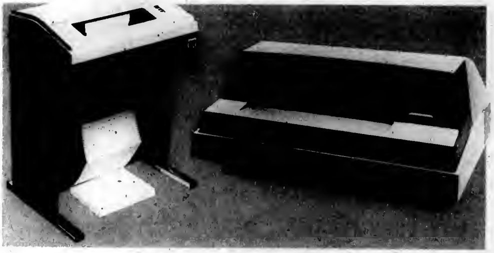
A maximum configuration consists of a 64K-byte minicomputer, four 10M-byte disk systems, 16 CRT terminals and a 300 line/min printer.

A minimum 250 configuration incorporates a 64K-byte CPU, three CRT terminals, a 10M-byte disk unit, 110 char./sec printer and battery backup. A maximum configuration provides a 128K-byte mini, four 10M-byte disk units, 16 CRT terminals, a 300 line/min printer and battery backup.

The minimum 240 system costs $22,900 compared with $29,900 for the minimum 250. Both are available from Randal at 365 Maple Ave., Torrance, Calif. 90503.



'The Programmers Are Really Worried. They Claim the Computer Has Been Reading Self-Help Books.'



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System Tracks 8,000 Parts

Mini Helps Machine Supplier Double Its Size

BERLIN, Conn. — Polymer Machinery Corp. has doubled its size in the three years since it acquired a minicomputer, and vice-president and general manager Joseph Holthoff believes the system played a major part in that growth.

"I think a lot of companies restrict their growth potential by not using computer power," he said.

Polymer ~~markets and~~ services its own line of particle-reduction equipment as well as German-made Arburg injection molding machines, which fabricate precision-made plastic instruments and equipment parts.

Because customers expect first-class service when one of their machines breaks down, Polymer has programmed its 192K-byte Honeywell Information Sytems, Inc. Level 62 minicomputer to track more than 8,000 parts for the Arburgs and the granulator machinery.

Delicate Parts Balance

"Spare parts in our inventory tie up company money," according to Dick Smith, Polymer's vice-president of finance. On the other hand, "if a customer needs a spare part and we don't have it in stock, he may quickly become a former customer," Smith added.

One of the company's main concerns, therefore, is to avoid both overstocking and understocking its inventory.

To make matters worse, Polymer typically must endure a three-month delivery lead time when ordering Arburg parts from their source in Germany.

In addition to the minicomputer itself, the company's inventory management system incorporates a 96-column card reader, a communications controller, four communications lines, two receive-only printers, a 400 line/min line printer and 10 HIS 7700R CRT terminals. With this configuration, Polymer currently runs 220 programs plus the HIS Inventory Management System software package.

Before it acquired its present system, the firm managed its inventory with an IBM System 3/10, which was eventually replaced for "financial reasons," Polymer's DP manager Bob Clark explained.

Handling Orders

When customers order an Arburg part over the telephone, order-entry personnel check their computer-stored inventory listings with one of the CRT terminals to ascertain whether the desired commodity is in stock. The resulting display gives the operators a brief description of the item in question and tells them in which aisle, row and bin it is stored.

If the part is available, it is automatically subtracted from Polymer's inventory listing, and the 400 line/min printer generates a combination picking slip/shipping document.

Near the loading dock, a shipping clerk retrieves the customer's data file with another 7700 CRT terminal. Information on the screen indicates what method of shipment or which courier the customer prefers and lists billing information. When the part is picked up by a shipping firm, data such as the weight of the parcel, time and date of pickup, and name of the transport company is entered into the data base through the display terminal.

This information has helped Polymer track down lost packages, Holthoff said. Because the company stores the rate schedules of all major couriers plus those of the U.S. Postal Service in its mini, the system produces all invoices in batch mode at night for mailing the next day.

Predicts Order Trends

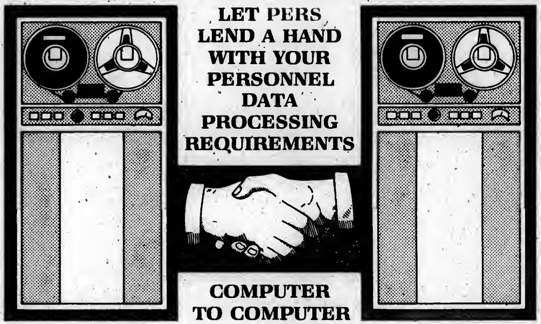
In addition to controlling spare parts inventory, the Level 62 helps the firm predict short- and long-term order trends.

Since its founding 15 years ago, Polymer has placed more than 5,000 Arburgs across the U.S. Although each machine arrives from Lossburg, Germany, as a "standard model," Polymer's customers can order as many as 50 options, each requiring 50 to 100 parts.

"The Level 62 helps us forecast the number of Arburgs we will sell, which options our customers will select and which parts we will need on hand at various times to be able to install the requested options," Clark said. "It takes us as long as six months to order and receive an Arburg from Germany. When a customer decides on an Arburg, he doesn't want to wait that long. So our short- and long-range forecasts for parts as well as Arburgs have to be accurate."

Polymer's back-order control system helps ensure the company will not forget to fill a single order, Clark said. As incoming parts are unpacked at the receiving dock, they are immediately added to the computerized inventory listing through the same loading-dock CRT terminal that records outgoing shipments. When a back-ordered part is entered into the computerized data base, the printer in the order entry department produces packing documents and subtracts the item from inventory.

In addition, the system operates a customer credit analysis program that Clark developed to help company officials find out why credits are issued.



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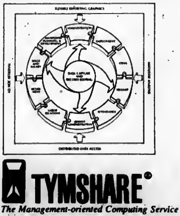

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Micro-Based Printers Unveiled

MOUNT LAUREL, N.J. — Program-controlled font selection and stored program diagnostics are reportedly among the features of four microprocessor-based line printers from Okidata Corp.

The Slim-Line series consists of 160- and 300 line/min models that print 7 by 7 characters plus 125- and 250 line/min models that output 5 by 7 or 9 by 7 characters.

All four printers provide 12 user-selectable font styles including lower case, double height and double width plus double height and width, a spokesman noted. During self-test, they also provide users with installation records by printing a coded header that lists machine options and revisions, he added.

In addition, the products are said to come with parallel interfaces for Centronics Data Computer Corp. and Dataproducts Corp. printers as well as with an RS-232 interface that accommodates seven switch-selectable protocols, seven switch-selectable speeds, auto-start and a choice of buffers.

Deliveries of the 250- and 300 line/min units, which measure 23 in. wide by 22 in. deep and 10 in. high, will begin this fall; deliveries of the 125- and 160 line/min models, which measure 8.5 in. high, will start during the summer.

In OEM quantities, prices for the units start at $2,500, Okidata said from 111 Gaither Drive, Mount Laurel, N.J. 08054.

User Finds Mini Affordable After Trying Several Options

(Continued from Page 53)

IBM 360/20, becoming the first direct mail firm in New England to install a computer system, Bernheimer claimed.

With the newly installed hardware, the company soon automated its mailing lists, payroll, job-cost accounting and accounts payable, while continuing to manually perform accounts receivable, general ledger and sales analysis.

Soon, however, the IBM equipment gave way to a Honeywell Information Systems, Inc. 120 with five tape drive systems and an off-line printer. Rental for the HIS system totalled $11,000/mo at a time when the company's annual revenues barely reached $4 million, Bernheimer recalled.

Although Hub Mail used the HIS system for five years, "we kept losing money on the list maintenance aspect of the business, partially because of the seasonal nature of direct mail activity," the company president explained. "The summer months are usually slow, while the November-December holiday season taxes our capacity."

Service Bureau Tryout

Concluding that their company needed a large system only a few months of the year, Bernheimer and his associates in 1973 delegated the list maintenance function to a service bureau. With one of their major applications no longer on-line, Hub Mail officials decided to replace their relatively large HIS system with a minicomputer to which they planned to assign their remaining commercial and accounting functions.

Eventually, they also planned to add accounts receivable and sales analyses to the prospective system, while continuing to do general ledger and profit analysis manually, Bernheimer said.

After examining several minicomputer options, Hub Mail finally chose to perform its commercial applications with a Singer Co. System Ten, at the time one of the few minicomputer-based systems that could support interactive CRT terminals. Two years after signing the Singer lease, however, support for the system deteriorated, Bernheimer said, and Hub Mail once again had to reassess its DP options.

Company officials first evaluated hardware from Digital Equipment Corp., Data General Corp. (DG), Nixdorf Computer, Inc. and Burroughs Corp. They then narrowed the field of candidates to DEC and DG before selecting the latter's 128K-byte Eclipse minicomputer with an 800 bit/in. tape drive system, 96M ;te disk system, four CRT terminals, teletypewriter console and 300 line/min printer.

A systems house oversaw Hub Mail's hardware conversion and wrote its program development software, which included extended Basic and DG's Mapped Real-time Disk Operating System.

Hub Mail picked the DG system over rival hardware partly because of the availability of an industrial marketing applications package developed for Eclipse systems by a West Coast firm. Dubbed the Inquiry Handling and Analysis system, the package performs sales lead evaluations, Bernheimer explained.

"We have a lot of competitors in the New England area that offer an inquiry-handling service," he said, "but none of them saves the data and uses it for follow-up information such as cost-per-qualified lead, development of qualified prospect lists, media analysis and other marketing information."

In addition to providing follow-up analyses of inquiries, the system performs all Hub Mail's accounting functions, including those that were formerly done manually, Bernheimer said. These functions include payroll, accounts receivable and payable, general ledger and job-cost accounting.

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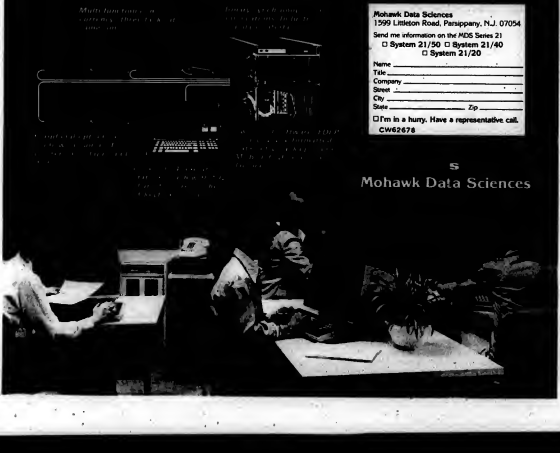

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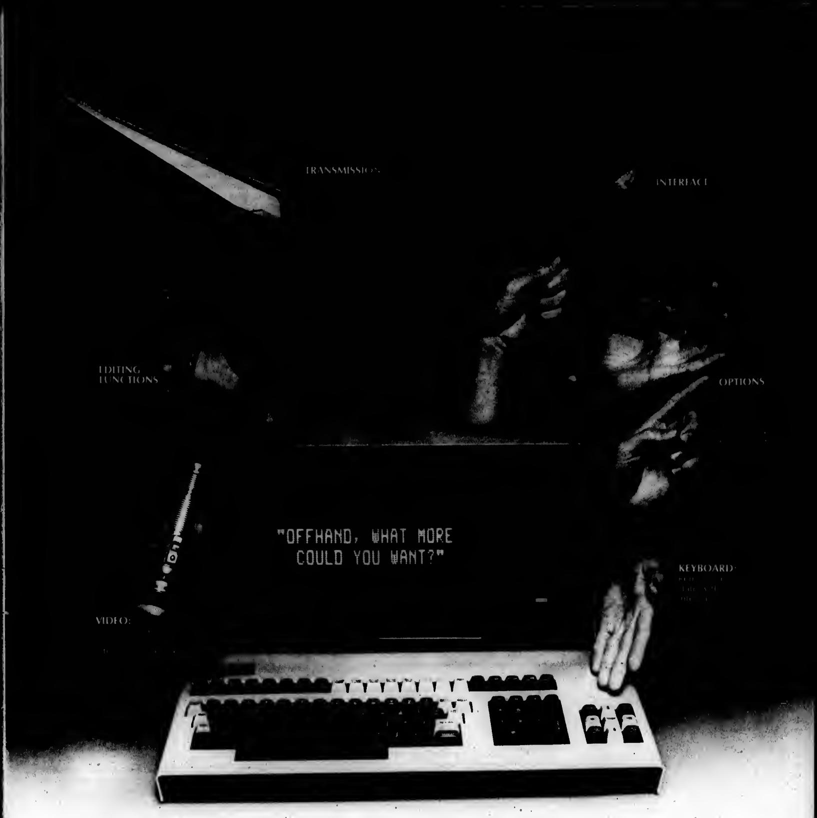

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Prepared by Chickering/Howell, Los Angeles.

Infoton 400

Mini Provides Firm Support for Floor Maker

MAPLE SHADE, N.J. — An industrial flooring manufacturer here is using a Microdata Corp. Reality system for its sales support and reportedly liked the equipment enough to become part owner of a local Microdata dealership.

Stonhard, Inc. which markets a line of 20 products through 85 salesmen in 10 regions, previously used an IBM System/3 to run its accounting programs. The company decided in 1974 to automate its sales support, but found a batch-oriented System/3 could not support on-line terminals.

After evaluating several alternative small business systems, Stonhard chose a Microdata system, although the firm continues to use the System/3 for accounting purposes.

Stonhard's salesmen in the field each day used the phone or the mail to send in their call reports and requests for quotations.

The information is then keyed into the system to form a combined customers-and-prospects data base that contains more than 100,000 records.

Various attributes in the records allow data to be retrieved in a number of different ways. Based on request for quotations, the company generates proposals. When the proposals are signed and returned by the customer, orders for materials are written.

Once a job is completed, a salesman sends in a completion report, and the system prepares an invoice and updates the salesman's commission record.

The Stonhard system consists of the Reality with 64K bytes of memory, a 40M-byte disk drive unit, a 600 line/-min printer, two Diablo systems, Inc. printers and 16 on-line Lear Siegler, Inc. terminals.

The 16 CRT terminals are used by clerks in the sales support department to enter call reports and by the four sales coordinators to retrieve data and help agents in the field solve sales problems, Stonhard spokesmen said.

In addition, each of the regional sales managers has a portable teleprinter to access the system from their homes.

The system allows Stonhard to produce a sales analysis at any time and by various attributes including sales region, type of customer, salesman, date or volume of previous sale, company officials explained.

With the system, salesmen have reportedly boosted their sales because they can receive up-to-date information on customers and territory. The system also periodically reminds salesmen to follow up sales prospects and helps regional managers pinpoint the most promising of these potential customers, Stonhard said.

When a large corporation is building a new plant, for example, the company can find out whether Stonhard has approached that corporation before and then solicit the potential customer's business. Managers can also review each salesman's performance any time during the week using one of the portable terminals, the officials noted.

Customized Correspondence

Customer correspondence can reportedly be customized according to the company's specifications. One result of this capability is that direct mail returns have increased by 33% since the system's installation.

Another result is that while the company's business has doubled, its sales support staff has remained the same size, the firm reported.

The company also plans to use the system for inventory of raw materials as well as for finished products, the records of which are already automated by the system.

The CPU cost approximately $110,000, and the printers and CRTs cost about $80,000, according to the company. Amortized over five years, the monthly price totals approximately $3,000 plus maintenance. The Reality system, which incorporates almost 20 terminals, therefore costs nearly the same as the System/3.

An additional advantage with the current system is that all data entry is done by clerical personnel who needed only a few hours of training to learn how to operate the equipment, spokesmen explained. Management personnel use the system as well — the company's controller functions as DP manager.

Stonhard's full-time DP staff consists of two members — the coordinator, a former clerk who helps solve operator problems; and a programmer.

One of the most important reasons for the success of a system is corporate commitment, according to the firm, which evaluated its configuration not in terms of dollars, but as a tool that would allow salesmen to do jobs which were previously impossible, officials here said.

Stonhard's case history was taken from Management Information Corp.'s publication, How Small Businesses Use Computers. The publication is a 40-page collection of applications case histories and can be purchased for $15 from the firm at 140 Barclay Center, Cherry Hill, N.J. 08034.

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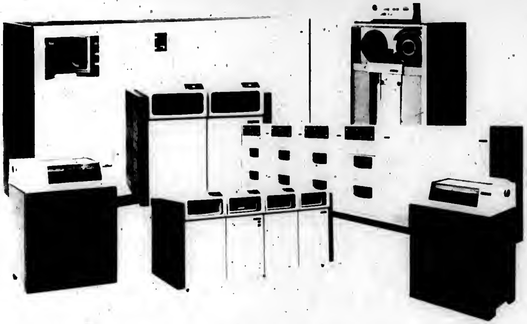

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Extends Microsystem Line

Futuredata Aids 6802, 8085 Development

LOS ANGELES — Futuredata Computer Corp. has extended its line of Microsystem microprocessor development systems to support users of the Motorola Semiconductor Products, Inc. 6802 and the Intel 8085.

The Microsystems, which currently support the 8080, 6800 and Z80 microprocessors, offer hardware and software capabilities. Hardware development is backed by Microemulator in-circuit emulator and debug packages; software tools include monitors, debuggers, editors, assemblers, utilities, relocatable macro assemblers, linkage editors and Basic compilers, according to a spokesman.

Range of Systems

The user can select a range of disk- and tape-based Microsystems for the 6802 and the 8085 according to the level of performance needed, Futuredata said. Each system includes the MPU with up to 64K of memory; a high-speed, 960-character CRT with Ascii keyboard; dual floppy disk or cassette tape unit; operating system software; and documentation.

System features include two RS-232 serial ports, an 8-bit parallel TTL I/O port, real-time clock, programmable read-only memory (Prom) bootstrap and memory write-protect under software control.

The Microsystem/31 Model 6802 and Microsystem/31 Model 8085 with the Microdisk/3 dual 8-in. double-density floppy disk unit and 16K memory cost $7,975 each.

The Microsystem/32 Model 6802 and Model 8085, each of which includes the Microdisk/4 dual 8-in. double-sided, double-density floppy disk unit and 16K memory, cost $8,975. The Microsystem/15 Model 6802 and Model 8085 systems each include 32K bytes of random-access memory (RAM) and the firm's Quickrun, a co-resident assembly and interactive debugger system, with monitor/debugging, editor and assembler in memory and source and object code. Each is priced at $4,975.

The optional Microemulator costs $1,250; Basic compiler and resident disk operating system packages are available separately at $300 each. Additional 16K RAM modules start at $650:

Futuredata is located at 11205 S. La Cienega Blvd., Los Angeles, Calif. 90045.

Futuredata Microsystem Development System

California Managers Report

Crime Wave Hitting Retail Shops

By Tim Scannell
CW Staff

Computer stores and hobbyist marketplaces in southern California are finding themselves the target of thieves who concentrate on small, expensive items such as boards and microcomputer memories.

Selling computers and computer parts, according to one area manager is no longer "the nice, friendly business it used to be."

"We had quite a few problems with thefts in January and February," Allan Porter, president of Mission Control, recalled. Located on Wilshire Blvd. in Los Angeles, the store has apparently been the one hit hardest by the new wave of criminality.

"The thieves took a total of four boards out of two different computer systems," Porter said. "In one instance, they walked in and asked the salesman to take the cover off the machine, which he obligingly did.

"They then distracted him for a moment and he turned his back. In that short period of time, they walked off with two of the boards."

The criminals appear to be "fairly technical," Porter said, "a little familiar with computers in general. They knew, for instance, that one machine had an S-100 bus and they also knew that the machine used part of the motherboard for the serial and parallel I/O ports."

The thieves had the salesman remove the comptuer's cover under the pretense of wanting "to see what [the motherboard] looked like."

Selective Thieves

The robbers are proving to be very selective. "There are lots of parts in the machine, some of them more expensive than the ones they took. They knew just what they wanted and stole just particular boards," Porter noted.

Police classified the thefts as burglaries rather than as shoplifting because of the selectivity that was involved. "First of all, we had to explain to them just what a board was and the cost of the missing piece," Porter said. "It turns out that if someone comes in with the intent to steal and steals a particular item, then it's classified as a burglary. If they come in and just see something lying around and they pick it up, that's shoplifting."

"We really didn't understand the difference until we talked with our insurance man. All we knew was that we were out a couple of thousand dollars," he added.

Insurance policies usually cover burglaries, but will not cover shoplifting, he said.

"Several stores in the Los Angeles area have experienced similar problems, Porter observed. One store that had been open for less than a week had an entire mainframe stolen.

(Continued on Page 60)

Micro Chips

Master I/O Board Works With S-100

CHICAGO — An S-100 bus-compatible I/O board, introduced by Space Time Productions, is said to contain enough read-only memory (ROM), random-access memory (RAM) and I/O to replace boards containing real-time clocks, frequency/period counters, programmable read-only memory (Prom)/Ram and parallel serial I/O.

The Master I/O Board contains 1K of RAM and 3K of ROM, as well as two 8255-type chips that can be programmed as I/O, interfacing and bidirectional ports; one 8253 chip that incorporates three 16-bit counter/timers; and one 8251-type peripheral chip that can be programmed for various clock division ratios, Space Time said.

The bare board is priced at $47.50 while the complete unit, assembled and tested, costs $369. Documentation including schematics, a parts list, parts layout and operations manual is also available from the company at 2053 N. Sheffield, Chicago, Ill. 60614.

Word-Processing Program Supports Pet Micro Users

BROOKFIELD, Conn. — Connecticut Microcomputer Corp. has unveiled a word-processing program for users of Commodore Business Machines, Inc.'s Pet microcomputer, RS-232-type printers and the firm's printer adapter.

The program permits the composing and printing of such materials as letters, flyers, manuscripts, advertisements and articles, according to a spokesman. Script directives include line length, left margin, centering and skip.

Edit commands allow the user to insert, delete and move lines, change strings, save data on cassette, move data up and down, print and type, he added.

The word-processor program costs $29.50 from Connecticut Microcomputer at 150 Pocono Road, Brookfield, Conn. 06804.

Prototyping Circuit Board Accommodates 70 DIPs

SYLMAR, Calif. — A prototyping circuit board from Vector Electronic Co., Inc., said to be bus- and shape-compatible with Altair and Imsai microcomputer boards, holds up to 70 14-pin or 16-pin dual in-line packages (DIP) or any combination of DIP sockets with .3-, .4-, .6- or .9-in. lead spacing.

Called the Any-DIP plugboard, the Model 8804 has 100 card-edge contacts on .125-in. centers to accommodate an S-100 bus organization, the firm said.

Two 100-hole rows of individual .1-in. spaced pads across the top of the board permit additional input/output via ribbon wire assemblies, a spokesman noted.

The 8804 plugboards are priced at $21.95 each in quantities of one to four; $19.76 each in quantities from five to 24; and $17.56 each in quantities over 25.

Vector Electronic is at 12460 Gladstone Ave., Sylmar, Calif. 91342.

Users of 6800-Type MPUs Offered Industrial Basic

LAFAYETTE, Ind. — A Basic interpreter for Motorolo 6800-type MPUs was designed by Wintek Corp. for process control and monitoring functions associated with industrial applications.

Dubbed the Wintek 4K Basic, the interpreter resides in random-access memory (RAM) or programmable read-only memory (Prom) and features control of interrupts, direct memory read and write, Assembly language subroutines and a flexible I/O, the firm claimed.

The unit retains many of the advantages of an interactive, high-level language and incorporates control structures such as IF ... THEN ... ELSE and ON ... GOTO/ON ... GOSUB, a spokesman added.

Unattended Operation

The interpreter immediately enters the "Run" mode when the Basic program is stored in Prom. This reportedly allows for unattended operation in dedicated applications.

The Wintek 4K Basic is available on cassette for $95 or in Prom or a read-only memory (ROM) module for $299.

The source listing, priced at $95, and an OEM license, for $2,000, are also offered by the firm at 902 N. 9th St., Lafayette, Ind. 47904.

DP Retailers in California Beset by Wave of Thievery

(Continued from Page 59)

"The individuals acted very interested in the computer and then asked the salesman to go into the backroom for a piece of literature which, it turned out, he didn't have," Porter said. "When he came back out, they had walked off with the machine."

"It doesn't happen every day and the thieves usually concentrate on new and high-priced items," according to Greg Puckett, marketing manager for Jade Computer Products in Lawndale, Calif. Jade recently lost a 32K memory board and a CRT controller to burglars.

"We've never been hit by a team," Puckett said, "just individuals." At the time "we only had two people at the counter and it was very easy for them to be distracted just by general goings-on in the store."

Reasons for Increase

This type of crime has increased for various reasons, according to several managers. "There's an increase in the number of users," Porter said, "and most of the boards were hobbyist-oriented."

There has also been an increase in the number of publications that carry requests for used equipment. "People probably see an ad in one of these magazines or newsletters, make a deal for that board and then walk into a store" to steal it, Porter conjectured.

"Before, it was a fairly restrictive type of people we were dealing with," Puckett commented. "More people coming through your doors increases the probability of there being more and more bad people among your clientele."

A spokesman for the Sunshine Computer Co., in Carson, Calif., however, offered a more definitive reason why there is currently an increase in computer store thefts. "There are people out there that I consider to be bums and they don't want to pay like everyone else does," he claimed. Those people choose instead to steal "whatever they can get their hands on."

Two stores, Byte Shop of Santa Barbara and Tech-Mart in La Jolla, Calif., hinted that perhaps the problem lies in the type of clientele that a particular business attracts. "We've had no problem at all," the Byte Shope spokesman said. "We sell primarily business systems and we have businessmen that come in here — we don't carry hobbyist equipment at all."

Tech-Mart deals in whole systems rather than over-the-counter parts, a spokesman for that firm stated, "so our deliveries are under contracts for the most part."

A number of stores have taken several precautionary measures to guard against future burglaries. Mission Control secures all boards to the computer's chassis by using a stainless steel cable and clamps so the boards can't be removed, Porter stated.

A recently instituted policy also forbids employees to remove covers under any circumstances. "We watch people more carefully and are particularly suspicious of anyone that wants to see the inside of a machine," Porter said.

So far, he added, the tighter security measures have not hurt sales. "A hobbyist knows what the inside looks like," he pointed out, "and a businessman doesn't care."

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Adapso Report Predicts

Services to Grow 17%/ Year Through '82

By Marcia Blumenthal
CW Staff

NEW YORK — The computer services industry is expected to continue growing at an annual rate of 17% through 1982, with revenues predicted to climb from $6.9 billion in 1977 to about $16 billion by 1982.

These and other statistics from the annual industry report were presented during the fifth annual press and financial analysts conference held here recently by the Association of Data Processing Service Organizations, Inc. (Adapso).

In addition, computer service industry experts analyzed the opportunities and threats resulting from such trends as minicomputer proliferation, IBM "revenue-gobbling". strategies and a possible recession.

Peter Cunningham, president of Input, the market research firm which prepared the report for Adapso, said that processing services accounted for $5.2 billion of the annual computer services revenue in 1977, with professional services following with $1 billion and software products with $700 million. The overall pretax industry profit for the year was 11.3%.

Software Fastest

Although the industry is growing at about 17% annually, Cunningham noted that software products were the fastest growing sector of the services industry and could take off even more rapidly than projected, particularly if IBM unbundled its operating system software.

John Imlay, president of Management Science America, Inc., said that operating systems are the most profitable and fastest growing segment of the software sector.

As evidence of software's profitability, Imlay pointed to the entrance of some of the "Big Eight" accounting firms into the software business and IBM's announcement of a personnel application package.

Like software, the international market, particularly in Western Europe, is growing quickly. Cunningham said revenues from the international market increased 49% from last year.

Encroachments by Minis

Although the software and international segments were predicted to grow faster than the service industry as a whole, the financial analysts were deeply concerned about users of processing services moving to in-house minicomputers.

Cunningham responded that 80% of the processors completing the survey admitted to being vulnerable to the influence of minicomputers, with most companies estimating about 30% of their business could be threatened.

However, Cunningham said that smaller companies perceived the threat as more imminent than larger companies did. In fact, the survey indicated that general business applications, particularly accounting, which is the mainstay of many smaller processing firms, would be the hardest hit by a user switching to an in-house mini.

However, as a means of parrying the minicomputer's thrust, Richard L. Crandall, president of Adapso and also president of Comshare, Inc., suggested that the processing firms could turn a threat into an opportunity.

There are apparently two camps in this growing battle. One group of processing firms will install minis at user sites; 60% of the firms surveyed said they would resort to this tactic either this year or next year. The other group will wait it out and see what happens.

Another threat comes from IBM, the panelists agreed. But, upon probing by the financial analysts during the question-and-answer session, the industry representatives did not see IBM as a major threat to the current base of business.

The inroads IBM could make into the current customer base of the service industry would not be great enough to satisfy the revenue-gobbling needs of the giant. IBM, according to Crandall, would most likely go after the giant-sized new markets such as electronic funds transfer, electronic mail and the $40 billion printing industry.

Effects of Recession

Another major concern of the financial analysts was the impact of a recession on the services industry. While not glossing over the effects of a recession, Crandall indicated that some sectors of the service industry are more immune to a recession than others. Processing will continue to be done as long as a company has business, he noted.

Besides the danger of a recession, Crandall pointed to some warning signals for the industry to monitor. In particular, Crandall mentioned that staff costs in the industry are rising because of the demand for people with a wide range of expertise, and these people are paid consultant's rates.

Time Seen Ripe to Start New Technology Firm

By Marcia Blumenthal
CW Staff

ANAHEIM, Calif. — "Now is the best time since 1969 to start a new technology company," according to venture capitalist Brent T. Rider.

However, Rider's optimism was qualified with a caveat — "To obtain funding, you must have a company, not an idea," the president of Union Venture Corp. of Los Angeles warned.

Rider and other venture capital financiers and founders of high-technology companies also stressed that a well-organized management team is as important as new technology when seeking funding in today's venture capital market.

Speaking at a session at the National Computer Conference here recently, panelists emphasized the need to size up the marketplace and consider the retaliatory strategies of competitors before launching a product with new technology.

Most importantly, they cautioned that the new product must have two to four times the advantage of existing products in order to survive in the marketplace.

Rider, a 10-year venture capital veteran, recalled that 10 years ago a company could be funded on an idea accompanied by an inventor. But today a new company must have a solid management team seasoned in marketing, finance, engineering and production.

Furthermore, he stated, the product must have a completed prototype before venture capitalists will bite. "Venture capitalists will not fund pure research," Rider said emphatically.

Attractive Areas

In assessing opportunities for venture capital, Rider said that investors are currently interested in new companies involved with peripherals, microcomputers and packaged systems.

Companies starting new businesses are expected to show black ink much earlier than they

(Continued on Page 62)

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IBM Series/1 Shipments Seen Peaking in 1980

ANAHEIM, Calif. — The biggest year for shipments of the IBM Series/1 minicomputer is probably two years away, according to a man who makes plug-compatible peripherals for IBM's first entry into the world of minicomputers.

Louis B. Horwitz, president of Datum, Inc., said Series/1 shipments will be good this year and next, but he expects the best year for such shipments to come in 1980.

IBM will place at least 25,000 of the units, he said, but added that the firm would probably ship 50,000 even though the first year of shipments has not been up to IBM's expectations.

IBM's shipments were below corporate expectations basically because the firm did not realize it was playing in a new marketplace in which it takes the customer some time to evaluate new products.

For the first year, Series/1 systems have been going out in evaluation quantities, Horwitz said, and now the production orders are coming in and the Series/1 is "popping up all over."

But because IBM is not offering a full range of peripheral equipment for the Series/1, the firm has left a larger market for independents such as Datum, he indicated, adding that some IBM salesmen are recommending Datum tape for the Series/1 rather than lose the order to a mini maker who offers a full line of peripherals.

In 'Good Shape'

Datum, which offers a complete line of Series/1 peripherals, is in particuarly good shape, Horwitz indicated, because he "doesn't believe IBM will move into tape," which is Datum's strong point.

"IBM will ignore tape because of its disk orientation," he said.

Today the Datum business is a "nice mix" of systems houses and software companies that are moving into the Series/1 marketplace, he said, adding that these types of firms will probably make up the bulk of the Series/1 marketplace over the long run, even though IBM is now selling some of the systems to its traditional Fortune 500 type of customer.

The entry of Control Data Corp. into the peripherals market for the Series/1 will only serve to give the marketplace visibility, he said, and while CDC will provide more competition, its entry is really a plus.

In addition, the plug-compatible manufacturer's president indicated that there would be a great deal of turmoil in the marketplace for the next few years, particularly in the disk arena as that technology changes rapidly.

In another area, Horwitz indicated that there will be some trouble ahead for the microcomputer marketplace, since there are so many undercapitalized entrepreneurs in the business today and users are offered some questionable products such as audio tape cassettes for digital storage.

Present Status

Datum, he said, has gone through some troubles and is now a "viable company" for its size ($18 million in revenues last year).

Presently, peripheral products make up 65% of the firm's business, he said, and the firm is growing at between 35% and 40% per year on a revenue basis.

At the same time, it is making enough of a profit to be able to invest more than $1 million yearly in R&D, which amounts to about 6% of total sales, he said.

The stock now sells for approximately $4 per share, he added, indicating that when it gets to around $6 per share it might be used to mount some acquisition campaigns.

Seeks Mini Growth

The firm basically wants to grow in the minicomputer peripherals area, Horwitz indicated, expanding its product line in the electromechanical peripherals field, first in tape and then in disk.

Around 80% of Datum's peripherals business is in tape today, he said, adding that the firm is staying away from the floppy disk market because the margins are slim even though the interface is "easy."

While the firm is primarily a peripherals supplier, Horwtiz indicated that it might consider software packages for the Series/1 in the next few years in order to expand its position as a supplier to that marketplace.

Overall, Datum should be a $35 million company in the "next couple of years," he said, adding that it needs to get to that size in order to be able to withstand any downturns in the economy.

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Time Ripe for Beginning Technology Firms: Panel

(Continued from Page 61)

were in the past, he noted.

A bright ray in the venture capital market, Rider explained, is the Steiger Bill now in Congress. If passed, it will result in reduced taxes on capital gains. Entrepreneurs will benefit from the bill's passage, Rider predicted, because more investment will be spurred not only from venture capitalists but also from all sectors of the investing community seeking new companies.

It now looks as though the bill has a good chance of passage because the Administration has eased off on its earlier opposition stance, Rider said.

Factors to Analyze

Leonard Mautner, a partner in the venture capital firm of Goodman and Mautner, Inc. of Los Angeles, agreed with Rider that a well-organized management team is an important consideration in evaluating new companies for possible funding.

In addition, Mautner decides whether to invest in companies with new technology by analyzing the marketplace, the product and the business plan of the company.

Mautner also assesses whether the people starting the venture have the entrepreneurial willingness to make a commitment to hard work. If the commitment isn't there, Mautner advised would-be entrepeneurs to "lie down and wait until the feeling passes."

Destroying Competition

Representing the other side of the dollar were Robert H.F. Lloyd, president of Conver Corp. of Cupertino, Calif., and Renn Zaphiropoulos, founder of Versatec Corp.

Lloyd presented a scenario showing how an established company would engage in price cutting to destroy a new competitor.

First, the established company with a mature but profitable product will lop a little off its already healthy profit margin, hoping to stifle the newcomer.

New technology, Lloyd explained, is more vulnerable to attack if prices of the existing technology are dropping.

Further Trimming

After the first price chop, the company may decide to trim more fat by eliminating R&D and market research for the mature "dead" technology. In some cases, companies may cut prices even to the point of losing money for a particular product line for a certain period of time, relying on other company products to make up the loss.

This last-ditch effort, Lloyd claimed, is designed to drive the new company out of the marketplace. If the established company is successful in driving out the technologically superior product of the new company, the mature product will rebound and continue making money for the established firm.

"Your new product," Lloyd warned, "has to have two to four times the advantage over existing technology to outlast price reductions of competitors."

Versatec's Renn added to Lloyd's remarks, summing up the challenge as follows: "If the benefits to customers are not attractive with respect to price, most likely your business will fail."

Government's Role Crucial

Japan's 10-Year Effort in DP 'Extraordinary'

By Marcia Blumenthal
CW Staff

ANAHEIM, Calif. — In the early 1960s, the Japanese government undertook extraordinary measures to close the 10-year technology gap that existed between the U.S. and Japan, according to Osamu Ishii of the Electrotechnical Laboratory in Tokyo.

In fact, with its sponsorship of the National Research and Development Program and the Super High-Performance Computer Development Project, the Japanese government has been largely responsible for making Japan today second only to the U.S. in the number of computers installed, Ishii said at a National Computer Conference session here recently.

Based on the technology developed under government sponsorship, he said, the major Japanese computer manufacturers all introduced third-generation computers for commercial applications by the end of the '60s.

Another major milestone for the Japanese computer industry, also promoted by the government, was the reorganization of the six domestic computer manufacturers into three groups, with each group developing a new computer series.

The Fujitsu-Hitachi group developed the M series; the Nippon Electric Co.-Toshiba group, the Acos series; and the Mitsubishi-Oki group the Cosmo series. Ishii indicated that each of the groups had completed all models of its series by the spring of 1977.

Ishii also noted that unlike the U.S. industry, the Japanese computer industry was started by telecommunications equipment manufacturers as opposed to business equipment manufacturers. In addition, the Japanese were able to bypass vacuum tube systems, moving directly into solid-state computers.

Today the Japanese have built large-scale integration and packaging technology, IBM compatibility, virtual storage, multiprocessing capabilities into their latest generation computers, Ishii said.

The three new series roughly correspond to the performance scale offered by the IBM 370. Originally, the cost/performance of these series surpassed that of the IBM 370. However, Ishii said that when IBM cut the price of the 370 and announced the Series 30 processors in 1977, the situation changed.

Future technology advances stressed by the Japanese, according to Ishii, are systems architecture and very large-scale integration (VLSI). In addition, the Japanese are attempting to overcome input/output difficulties connected with "Kanji" — the ideographic portion of the Japanese language.

The systems architecture effort is geared to reducing system overhead caused by huge amounts of supervisor processing for multiprocessing control and high-level language statements.

The VLSI project, Ishii explained, is under the support and guidance of the Ministry of International Trade and Industry. Production and process techniques for submicron patterns using electron-beam, X-ray and conventional photo-lithography are being developed, Ishii said. Between 1976 and 1979 the government expects to invest more than $233 million in this project.

Japanese Language Poses Problems Involving I/O

ANAHEIM, Calif. — One of the difficulties Japanese computer manufacturers are trying to overcome is developing input/output devices to handle "Kanji," the ideographic portion of the Japanese language, according to Osamu Ishii of the Electrotechnical Laboratory in Tokyo.

The Japanese language is usually written in a mixture of Kanji and "Kani" (phonetic) characters. There are only 48 phonetic characters. However, the Japanese commonly use 2,000 to 3,000 Kanji characters and often use as many as 10,000 of these ideographs, Ishii explained at a recent National Computer Conference session here.

Because the Japanese language is not adaptable to a purely phonetic writing system, Kanji is an essential means of communication. Most computer systems in Japan today are not powerful enough to handle Kanji because of the lack of suitable input/output devices.

Input is a more difficult problem than output, Ishii noted, because of man-machine interaction. A Kanji typewriter has many keys because of the number of character sets.

Designer Explores Impetus Behind Development of 370

By Howard A. Karten
CW Staff

ANAHEIM, Calif. — The motivation for developing the IBM 370 came mainly from two sources, according to IBM computer architect Andris Padegs: the experience with 360 architecture and the rapidly declining cost of technology in the late 1960s and early '70s.

During a recent National Computer Conference session here, Padegs, who is said to be one of the few designers still at IBM who was involved in the design and architecture of the 360, described four critical constraints in the design of the 370:

First, any valid 360 application program had to run, unmodified and successfully, on the 370.

Second, the 370 had to be able to run 360 operating systems. It also had to be able to operate 360 I/O devices and, finally, it had to preserve open-endedness and design generality to keep the way clear for follow-on products.

Within these constraints, Padegs added, the 370 design had four objectives: to improve reliability, availability and serviceability; to boost the precision and predictability of the system; to enhance the performance of application programs; and to provide additional functions for operating systems.

One key to achieving these goals, the designer said, was frugality and control in allocating resources on the 370. Thus, requests for additional basic assembler instructions, for example, were appraised using what IBM calls a "figure of merit."

Defined as the relationship between the change in value to the change in cost, this figure was one of the keys in deciding whether or not to add a new instruction. Other considerations were also applied to requests by IBMers for changes, such as the effect of the changes on CPU size, expected usage estimates for new instructions and the expected ease of integrating the new instructions.

Acknowledging that there were in fact some incompatibilities, Padegs told the large audience that these were limited to programs operating in privileged mode, so did not affect typical application programs.

Four main incompatibilities between the two systems were found, according to Padegs. These were the use of the Ascii-8 bit in the program status word; the addition of a new operation code for halting an I/O device; the addition of a new function called command retry, used in an I/O channel; and the fact that removing power from the system caused a clearing of storage.

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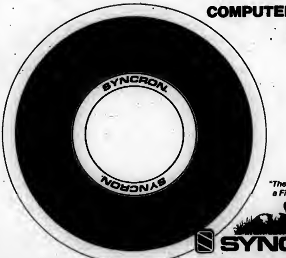

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PCC Chief Sees Billion-Dollar Personal Marts

By Marcia Blumenthal
CW Staff

ANAHEIM, Calif. — The home computer and the very small business system (VSBS) markets will become the billion-dollar sectors of the personal computer market — the VSBS now and the home market in the late 1980s — Ryal R. Poppa, president and chief executive officer of Pertec Computer Corp. (PCC), predicted recently.

Speaking at a special personal computing luncheon at the National Computer Conference here, Poppa said that in the last six months, significant trends have developed in the personal computer market. Poppa especially pointed to the clarification of market segments which in turn portend an industry shakeout and to the growth of what he called a "Kelly Girl" programming and systems design approach.

Because there is so much confusion surrounding the term "personal computer," Poppa defined personal computers as "work enhancement tools, not major capital goods that have to be maximized in utilization."

Drawing an analogy, the PCC chief likened the personal computer to the office telephone 50 or 60 years ago. "It was very typical to have one telephone stand in the middle of the office for everyone's use. You would wait your turn to use the common telephone, as it was not personal. Small computers are going to become personal in nature — we'll have one for each person."

Four-Sector Market

Poppa divided the market into four major sectors: hobby, home, personal computing and VSBS. Summarizing the hobbyist sector, he said wryly, "A hobbyist is happiest when his machine is not working."

Defining the hobbyist market as composed primarily of people who build from kits, Poppa indicated that market is approaching saturation and said PCC will ship its last kit this month.

By explaining that if the computer is used as a work enhancement tool, it is a business system, Poppa essentially eliminated the personal computing sector. "Personal computing will be a relatively small market segment because most computers today have some form of business payoff," he added.

Concentrating on the other two sectors — home and VSBS — Poppa entertained the predominantly male luncheon audience with a tape recording of a computer supposedly talking to an affluent suburban housewife and advising her of the critical tasks for the week — tennis matches and hair appointments among them.

Cost is the major limitation on the home system now, Poppa said. However, he added, a second, potentially more constraining factor is that building codes and related insurance law "do not contemplate the type of transducers or electromechanical actuators wired into the home that will permit a home to be run by computer."

The home computer market will not be developed by firms like PCC or Apple Computer, Inc., Poppa said. "Rather, these markets will be developed by the Honeywells, the Westinghouses, the Nutones and perhaps even IBM," the PCC president predicted.

The VSBS is the major market now, Poppa claimed, noting that it will grow substantially during the 1980s. He divided that market into three sectors.

The "stand-alone," independent small business with an annual volume of less than $3 million is the hottest sector right now, he said.

A third sector, the departments of large businesses, is similar to the second segment and one Poppa sees developing rapidly because of its proximity to the main computer center.

Turning to the trends in the marketplace, Poppa forecast a shakeout in small companies that entered the microcomputer field. By the early 1980s, he predicted, "we will be down to less than 50 firms of any substance."

The maturing of the computer store, with the most successful ones becoming local business equipment stores oriented to the office of the future, was also cited by Poppa as a significant trend.

The computer store will further contribute to the shakeout among the small independents, Poppa contended, because they will begin to limit their inventory to two or three manufacturers, thereby shrinking the total market size for the smaller companies.

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Center Hosted NCC '78 Visitors From Abroad

ANAHEIM, Calif. — Reading name tags without appearing obvious seemed to be a favorite pastime at the recent National Computer Conference here.

Some readers spotted attendees wearing name tags with official-looking blue ribbons displaying the words "International Visitor" who took in the exhibits and ate hot dogs, just like the rest of the more than 57,000 NCC '78 visitors.

The central meeting place for these foreign visitors was the International Center, a large, softly lit room off a quiet corridor of the Anaheim Convention Center.

Harry Coata and Anton Post, two Dutch visitors relaxing at the center, work for CSR, a remote computing services firm in Amsterdam. They were at NCC looking at minicomputers to replace a mainframe.

Costa and Post complained that NCC, unlike the Hannover Fair in Germany, was very congested — too many people and exhibits in a small place. They were amazed, however, to find the exhibitors so helpful and easygoing in the midst of such a frantic atmosphere.

Too many lectures with too little descriptive information was another drawback, Post said. The Dutch visitors also said they thought it was rude when people walked in and out of sessions.

In another corner of the center, Yoshihisa Ito, a Japanese journalist, socialized and discussed business with other foreign visitors. Ito, a writer with *Information Industries and Market News*, a Tokyo daily, was escorting a group of 33 people representing various sectors of the Japanese computer industry.

Although Ito's group spoke little English, he said it was here primarily to visit the Personal Computing Festival. Earlier, through arrangements made by the staff of the International Center, the Japanese visitors were given a special tour of California Computer Products, Inc.

Calcomp has two or three Japanese engineers, Ito said, which made the tour highly enjoyable for his group.

This is the first year the American Federation of Information Processing Societies (Afips) has sponsored the International Center. It was previously run by the U.S. Department of Commerce, but Dr. Jean Paul Jacob, the center's director, said that for various reasons the government declined to sponsor the center this year.

Although it was difficult to obtain space for the hospitality center, the courtesy was necessary because Americans are always treated well at conferences abroad, according to Jacob, who is on the staff of both IBM's Research Division and the University of California at Berkeley.

Registration 'First Aid'

The most important function of the center, according to Jacob, is "providing first aid for registration pains." More than 200 foreign visitors waited in line for as long as 3-1/2 hours only to discover that their preregistration hadn't come through. Jacob hopes Afips will have special registration for these attendees next year.

Aside from smoothing over registration pains, Jacob and his seven staff assistants were busy providing assistance with translations, lost passports, hotel reservations and instructions on how to use the telephones.

Jacob commented that foreign visitors had various reasons for attending NCC. "Some visitors were looking around to see what the competition is doing, some were here to get as much technical information as possible short of unscrewing the back off the machinery and some were users making buying decisions."

Approximately 1,800 foreigners from 41 countries visited NCC this year, Jacob estimated, adding that nearly half of them registered with the center.

Among the visitors was a group of 10 scientists and engineers from Peking. The "unofficial" group was organized by a business consultant, Jacob stated.

The largest foreign contingent registered with the center was a group of more than 300 from Japan, Jacob reported.

Other well-represented areas were Canada (42), West Germany (48), Scandinavia (60) and Latin America (95). Visitors came from as far away as Australia, Kuwait, Malaysia and Nigeria, Jacob said.

Jacob did receive some negative feedback from visitors. Some felt the conference was too large, and a few Europeans expressed a distaste for the use of sexy female models to demonstrate products.

On the positive side, the visitors told Jacob they had never dreamed they could see so much in so little time under one roof.

Scientists From China Took in Show's Sights

ANAHEIM, Calif. — A group of 10 Chinese scientists and engineers from Peking visited the National Computer Conference here recently during a leg of their month-long U.S. visit.

The privately escorted visit was organized by Arne deKeizer, a New York-based business consultant who said he has had a long-time interest in commercial and cultural exchanges with China.

DeKeizer reported that the privately organized visit was sponsored by the Chinese Electronics Society for the purpose of allowing the scientists from the various Chinese institutes to gain an overview of the American computer industry.

Private Group

As a private group, the Chinese were not available for an interview, he said. DeKeizer did not comment on the extent of U.S. government approval necessary to arrange the trip.

He did say, however, that he worked closely with the U.S. State Department and that the trip "was in the works a while."

The group will visit several computer manufacturers, deKeizer reported, but he did not indicate precisely what the Chinese scientists were interested in seeing.

DeKeizer noted that the general policy of both nations is to build relationships between the two countries with the expectation of increased opportunities for general technological exchanges.

Acquisitions

The Summagraphics Corp. has agreed in principle to acquire the computer graphics product line of The Bendix Corp.

Itel Corp. has agreed to acquire Delta Resources, Inc. of New York City for 300,000 shares of Itel common stock.

Comshare, Inc. has acquired the business and certain assets and liabilities of Valuation Systems Corp. (VSC), of Rolling Meadows, Ill., for an undisclosed amount of cash and notes payable. VSC is a consulting firm which specializes in services for replacement cost and current value measurement.

Technical Overview of Control Data's Multifunction Terminal

Basic hardware comprises a keyboard-display, one or two flexible disk drives and a matrix printer. Software includes an operating monitor, peripheral drivers, system job functions, system utilities, file manager, a forms language and BASIC.

Keyboard display. 2000 characters on 25 lines with 80 characters per line. Each character is generated from random-access refresh memory as a modified 7 x 9 dot matrix. Detachable keyboard.

Flexible Disk Subsystem. Consists of one or two drives that use standard single-side, double-density disks. Capacity is 0.5 Mbyte formatted storage per disk, 1.0 Mbyte total.

Matrix Printer. The optional printer accepts single or multipart paper, prints bidirectionally up to 132 characters per line at 70 lpm. Compressed print option.

Controller. A microprocessor-based controller in the display unit includes: ROM; up to 64 Kbytes of RAM; communications controller; peripheral controllers and keyboard display controller.

Forms Language. An extensive, operator-programmable forms language. Operator "coaching" appears on the CRT screen.

BASIC Language. Business-oriented, with features like: 14 digits precision; sequential, indexed and index-linked file I/O; character strings of up to 255 bytes; variable identifiers of up to 6 characters.

Communications. The terminal communicates with a host processor using Binary Synchronous (BSC) communication protocol. The system provides for auto answer and auto disconnect to allow the system to be polled while unattended. Speeds of 1200, 2000, 2400, 4800, 7200 and 9600 bits per second are supported. Protocol-compatible with the IBM 2770, 3770 or 3780. EIA RS-232-C Interface.

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CA Targeting End Users With Packaged Protos CPUs

ANAHEIM, Calif. — For the first time, Computer Automation, Inc. is selling directly to the end-user market with the introduction of its Protos general-purpose computer, Mike Saccomano, product manager for packaged sytsems for CA's Naked Mini Division noted here recently.

This is the first general-purpose, packaged, bundled system the firm has sold, according to George White, manager of special project development.

CA will only market the 128K megamini in more than single quantities to large users such as Dow Chemical Co. "We are aiming for the volume end-user market," White explained.

In particular, White said Protos is especially suited for multiprocessing, multiuser capability, with no environmental constraints.

The lack of a field service organization has been a major constraint in entering the end-user sector, Saccomano stated. Although the Naked Mini Division will offer limited field service for the product, the firm expects only a minimal demand for service because Protos will be purchased by sophisticated users who, in many cases, will be able to isolate and repair problems on their own.

CA expects to ship the $100,000 Protos by the first of the year and, according to Saccomano, is aiming for sales of about 200 systems per year.

DEC Designates Distributor

BOSTON — Digital Equipment Corp. has designated Hamilton/Avnet, an electronics distributor in the U.S. and Canada, as its first authorized stocking distributor for DEC's LSI-11 microcomputer products, effective July 3.

Hamilton/Avnet will stock more than $1 million worth of LSI-11 microcomputer modules and development systems. Demonstration equipment will be provided at each of its 36 stocking locations to give customers the opportunity to gain hands-on familiarity.

"As computer systems and their components become smaller and less expensive," Hamilton/Avnet president Tony Hamilton noted, "customers expect the same kind of off-the-shelf delivery that characterizes electronic components distribution."

Asked whether DEC will sell other products through stocking distributors, Ted Johnson, DEC vice-president of sales and service, replied that the company will do whatever makes sense to provide its customers with the best possible service.

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If you're an MIS executive, DP Manager, Supervisor or Programmer, you'll find our July 31st report especially valuable. If you market systems or utility products — your ad should be there. Closing date is July 14th. Or, to reserve space, call Terry Williams at (617) 965-5800.

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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San Francisco
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(415) 421-7330

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Contracts

Informatics, Inc. has received a five-year, $3.1 million contract from the U.S. Environmental Protection Agency for the design, implementation and operation of a computer-based information system to support the Office of Toxic Substances in carrying out the Toxic Substances Control Act.

Raytheon Data Systems has been awarded a contract valued at $1.6 million from the U.S. Customs Service to install PTS-100 terminals in offices at major ports of entry throughout the U.S.

Recognition Equipment, Inc. has received a contract for six Trace credit card processing systems, with a purchase value of approximately $5 million, from Analytical Computer Services, Inc.

Univac has been awarded $4.98 million contract for a number of systems to form the Network Control Center Data System. This system will be used to control and monitor the worldwide communications network of the National Aeronautics and Space Administration.

Computer Science Corp. has received two follow-on contracts for systems engineering services from the U.S. Army Missile Research and Development Command at Huntsville, Ala. The estimated value of the three-year and one-year task ordering contracts totals more than $4 million.

Bell Telephone Laboratories has signed a $7.3 million contract with Honeywell Information Systems, Inc. for the purchase of two large-scale computer systems and for upgrading of existing equipment.

Computer Sciences Corp.'s Infonet service will provide International Harvester Co. with time-sharing and related services throughout the U.S., Canada and Europe under a three-year contract valued at $3 million.

The Pertec Division of Pertec Computer Corp. has been awarded a renewal contract by Compucorp, Los Angeles, for FD400 floppy disk drives to be used in the Compucorp Model 450 small business computer system and the Model 491 disk controller. The two-year contract is valued at $200,000.

Valley Fidelity Bank and Trust Co. of Knoxville, Tenn. has signed an agreement with EFT Data Services, Inc. that will enable the bank to offer area retail merchants check verification/-guarantee and credit card authorization services.

Rivtow Straits Ltd. has entered into an agreement with the Canadian Data Processing Corp. for services to be provided on Canadian's Data's IBM 360/40 and soon-to-be-installed Digital Equipment Corp. PDP-11/70 system. The PDP-11/70 is valued at more than $250,000.

Canada Systems Group has been awarded a three-year agreement for DP report preparation by Collection Control (Central) Ltd. of Toronto.

The Harris Corp. has awarded a $2 million subcontract to Canstar Communications, a division of Canada Wire and Cable Ltd. of Toronto, to supply and install the fiber optics cable and DC power subsystem for a 50-kilometer telephone communications link being furnished by Harris for Alberta Government Telephones in Alberta, Canada.

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Long Range Planning activities involve research studies on a wide variety of subjects related to the telephone communications industry. These studies include such areas as data communications, new technology, new services, future switching networks, evaluation of new switching techniques and review of the impact of political, economic and regulatory considerations. Intent is to provide well founded counsel and recommendations to upper management on future development programs and courses of action.

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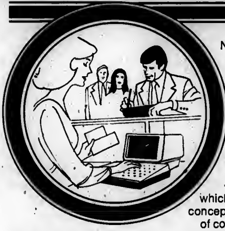

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- Data base orientation
- Marketing exposure

Qualified individuals are invited to submit resume of education, experience and salary requirements, in the strictest confidence to:

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- Familiarity with a major computer operating system
- 1-3 years experience documenting or working with system software (programmers with a flair for writing are invited to apply)
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- Who has excellent communications skills.

If you have the experience and are interested in this growth position, we want to speak with you.

Sales Training Specialist - Computer Systems

The Education Center has a rewarding and challenging opportunity for a person who has been successful in sales and has the ability to train salespeople in product and skills. This is a highly visible position which requires a person to have:

- A minimum of 3 years of computer sales experience, preferably with knowledge of transaction and interactive computer systems
- The knowledge and ability to relate hardware and operating system features to the sales force
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- Excellent writing skills.

Additional requirements: College degree and training experience preferred.

Excellent salaries and earning potential plus superior company benefits. Please send resume including academic background and salary history and requirements to:

Linda G. O'Connor
Career Opportunities
(617) 851-4111

WANG LABORATORIES, INC.

One Industrial Avenue
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EDP AUDITOR

Prominent Boston financial services org. seeks sharp EDP Auditor for Internal staff. Requirements include lge. COBOL business systems exp. & excellent customer interface skills. No travel. Excellent oppty. with an unlimited career path. Salary to $25,000. Contact Gerry Battists (Fee Paid)

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140 Federal St.
Boston, Mass. 02110
(617) 423-6440

DATA COMMUNICATIONS SYSTEMS ANALYSTS

Newly created key openings at various locations throughout the U.S. for Senior Systems Analysts with 3 or more years experience in data communications and BSC. Further experience with BTAM, TCAM, VTAM, or equivalent access methods helpful.

Salary, benefits and working conditions are excellent. Please call or send resume to:

PCC
CMC DIVISION

PERTEC COMPUTER CORPORATION

Don Hutchison
(213) 882-0030
Ext. 254 or 354
9601 Lurline Ave.
Chatsworth, CA 91311

Equal Opportunity Employer M/F

Senior Software Specialists

Our Systems Division has senior positions for experienced applicants in the following areas:

- N.C., Tool Design, Process Planning
- System Architecture, Data Base Management
- 3D Geometric Modeling
- Distributed Processing, Communications
- Graphics Applications

Gerber Scientific, long a leader in interactive graphics, has recently established a Systems Division to focus on the continued success and growth of this activity. These are key positions in the division offering excellent remuneration and fringe benefits.

Please send resume in confidence to:
Watson Peterson, Jr., Director of Personnel

Gerber Scientific Instrument Company
Systems Division
83 Gerber Rd. South Windsor, Conn. 06074

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COMPUTER PROFESSIONALS

Interactive Graphics

Duties include design and development (hardware and software) of interactive graphic systems including data management techniques and minicomputer systems. Emphasis will be to enhance the man-machine interface. Minimum three years experience with M.S. in Computer Science or Electrical Engineering desired.

Data Base Management

Duties include development of data management techniques emphasizing distributed data bases and interactive techniques for data analysis on minicomputer systems. Minimum three years experience with Ph.D. in Computer Science desired.

Systems Software for Minicomputers

Duties include design and development of innovative systems software from both a high level system concept viewpoint to detailed device handler implementation. Large scale PDP-11 IAS/RSX experience desired. Minimum of three years experience with M.S. in Computer Science or IEEE.

Opportunity for professional advancement is excellent for those having good communication and leadership skills. The positions offer challenging work in a diversified research laboratory environment. Send confidential resume stating specific position in which you are interested in confidence to E P Galbraith

An Equal Opportunity Employer M F

Battelle
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[illegible]
[illegible]

SYSTEMS OPPORTUNITIES

Growth of Dixico Incorporated, a Dallas based, diversified, international manufacturing company, enjoying a 30% growth rate, is resulting in major expansion of its management systems group.

Excellent growth opportunities, utilizing distributed data processing, are available in Dallas, Los Angeles and Connecticut in design development and administration of multiple, geographically dispersed computer-based systems.

You must have experience in design and project management related to manufacturing, financial and general business systems with data communications, and interactive processing in a distributed environment.

Explore this opportunity by sending your resume, including accomplishments and salary history to

Dick Atkins
DIXICO Inc.
P.O. Box 225118
Dallas, Texas 75285
Equal Opportunity Employer

DIRECTOR, DATA PROCESSING

Toledo, Ohio Financial Institution seeks experienced management to direct Data Processing Department. Company about to undertake major hardware/software/application expansion. Current environment includes 370/138 DOS/VS, CICS, DL/1. Preference given to candidates with:

- IBM 370 Management Experience
- Strong Management Skills
- College Degree or Equivalent
- Prior Insurance or Financial EDP Experience
- Excellent Communications and Human Relations Skills
- Knowledge of Long-Range Planning Techniques

This is a growth position. Excellent Fringe Benefits, Salary commensurate with abilities. Send Resume and salary history to Personnel Department, P.O. Box 943, Toledo, OH 43656. Equal Employment Opportunity and Affirmative Action Employer.

COMPUTER CENTER MANAGER

Masters degree in computer science, data systems or related area and significant experience in management of administrative and instructional computer support services required. Salary commensurate with candidate's educational background and experience. Submit letter of application, resume and nominations by July 10, 1978 to: Dr. Robert C. Cloud, President, Lee College, P.O. Box 818, Baytown, Texas 77520. (713) 427-5611. An Equal Opportunity Employer.

PROGRAMMER/ANALYSTS

Accepting the challenge is your job... Providing the challenge is ours

Challenging opportunities are available for professional programmer/analysts with at least six months experience we're growing to make room for you

Send resume to

Informatics Inc

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Equal opportunity employer

SYSTEMS SOFTWARE PROGRAMMER

Expanding technical support staff in a San Francisco Peninsula location needs a self-motivated individual w/the following qualifications: SYSGEN exp. in MVS or MVT in a single or multiple CPU environment. MVS or MVT maint. experience 3-6 yrs, Systems Programming experience includ. 2 yrs TSO exp. knowledge or MVS internals helpful. Willing to accept MVT experience and retrain. Excellent benefits. Salary range from $21K to $29K. Send your resume and salary requirements to this paper ad: CW Box 1560, 797 Washington St., Newton, Mass. 02160. An Equal Opportunity Employer, M/F/H.

FACULTY POSITION

Instructor or assistant professor teaching data processing, business information systems, COBOL, and RPG beginning August 21, 1978. Masters degree necessary. Send resume, transcripts and three letters of recommendation immediately to Dr. Robert A. Dager, Head, Division of Business, Northeast Missouri State University, Kirksville, Missouri 63501. An equal opportunity/affirmative action employer.

DP MANAGER

Position reports directly to Controller of med. size div. of major Central NYS mfr. Resp. will include project mgmt. from inception to implementation. Sophisticated Sys. 3 disk equipt. Oppty. for diversification into mfg. & financial mgmt. PICS & MRP sys. a plus. $22,000. Contact P Siegal. (Fee Paid)

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Buffalo, N.Y. 14202
(716) 842-0801

COMPUTER & MANAGEMENT SYSTEMS SPECIALIST

Prominent Washington-based natl. trade assn. requires leader to conduct member activities in mgt. science and manufacturing control areas. Must be degreed. Min. 5 yrs. computer applications exper.; RPG II exper. helpful. Writing and documentation abilities a must. Should be aware of and able to convey significance of developments in computer field. Exciting work in a growing, enthusiastic environment. Salary upper $20's. Send resume and salary desired in confidence to: Graphic Communications Computer Assn./PIA, 1730 N. Lynn St., Arlington, VA 22209.

DATA PROCESSING OPPORTUNITIES

To keep pace with Mobay's rapid growth, our Information Systems Department is aggressively seeking talented professionals with the following qualifications:

Systems Analysts

A degree and previous experience in the development of large scale financial and manufacturing systems, Data Base or CRT orineted background is desirable.

Programmers

Minimum two (2) years background utilizing ANS Cobol in IBM OS/VS environment. Knowledge of IMS, structured and on-line programming is helpful. A degree is desirable.

These positions are available at our Headquarters Facility, located near Pittsburgh, Pennsylvania and offer ample opportunity for career growth in a state-of-the-art environment.

Our compensation package which includes company paid benefits with relocation assistance reflect Mobay's position as an industry leader.

Please forward resumes with salary history to: Personnel Department.

Mobay
Chemical
Corporation
Penn Lincoln Parkway West
Pittsburgh, PA 15205

We are an Equal Opportunity Employer
M/F/Handicapped

Data Processing Manager

We are a large CPA firm seeking a Data Processing Manager for one of our clients, a small, independent sporting goods manufacturers in Northern New Jersey.

This newly created position is necessitated by the rapid growth of our client and presents an unusual growth opportunity. Plans are for greatly expanded computer capacity to be brought in-house.

The position will entail conversion responsibility and subsequent system operation and maintenance. Extensive programming will be required, therefore COBOL and RPG experience is a must.

Send resume and salary requirements, in strictest confidence to: P.O. Box 277, Department CW, FDR Station, New York, N.Y. 10022.

DIRECTOR OF DATA PROCESSING

A major company located in an ideal Southwest city has an immediate need for a Director of Data Processing. The successful candidate will have a minimum of 4 years experience at the manager or director level. Strong organizational ability combined with proven communication skills at all levels of management including user staff personnel are qualities needed to be successful. Staff consists of 18 people, including 9 professionals.

Starting salary and benefits are excellent, but are secondary to the levels of respect, reward and achievement open to you in this select environment. Send your resume specifying current salary level and requirements to:

CWBox 1599
797 Washington St.
Newton, Ma. 02160
Equal Opportunity Employer M/F

TEBOL PROGRAMMER

MAJOR INTERNATIONAL PETROLEUM COMPANY, located in midtown Manhattan, offers challenging position at corporate headquarters for an experienced TEBOL programmer. An excellent opportunity for creative utilization of State of the Art techniques.

Applicant must be aggressive, self-motivated and have ability to communicate effectively. Requirements include a bachelors degree and 2-5 years data processing experience with a minimum of 1 year programming using TEBOL and OS JCL.

We offer excellent growth potential, competitive salary and comprehensive benefits. Please forward detailed resume, in strict confidence, including salary history to:

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Newton, MA 02160
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Design & Development Engineers

General Electric has opportunities in the

Software Development Engineers

Join us and you'll be involved in developing software systems for on-line real-time applications in an industrial process control environment. Responsibilities will span system conception, systems design and diagnostic tests, system architecture, and hardware/software trade-off.

Senior and project leader positions available.

Requirements: A BS/MS in EE or Computer Science or equivalent.

Circuit Design Engineer

Develop advanced electronic circuits, both analog and digital, signal or power. Will design small subsystem modules including microprocessors, input/output electronics and data busses. Requires BS/MSEE with experience in related development and design work.

We'll provide fully commensurate salaries and comprehensive GE benefits including relocation assistance.

Roanoke Valley... of Virginia.

Few areas of the country can rival the scenic beauty and comfortable lifestyle of the Roanoke Valley.

**Find out more by sending your resume and salary history to: Mr. Thor Troisen,
General Electric Company,
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Sales Engineer

Microprocessor Development Systems

Openings in Boston & Philadelphia.

Experience as a design engineer, applications engineer or sales engineer working with minicomputers, minicomputer systems or microprocessor systems will provide you the opportunity to join the Tektronix sales team.

We need professionals with hardware, software and microprocessor experience. Product and sales training will be provided for you.

Applicants should have a current knowledge of digital hardware systems and assembly language programming experience. In addition, a strong interest and aptitude in customer oriented sales is necessary. BSEE or equivalent is desirable.

Competitive salary program includes incentive compensation. Benefits programs include a substantial retirement plan.

Call George Evans toll free at 800 638-4052, or send complete resume to TEKTRONIX, INC., 2 Research Court, Rockville, Maryland 20850.

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Tektronix
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BUSINESS SYSTEMS ANALYSTS

Telemed Corporation, a leader in the fast growing automated health care industry, has immediate openings for talented, committed professionals to serve as analysts within the Information Systems group. These analysts must have a strong applications background and be able to take a project from start to finish, including definition, design, programming and implementation. Knowledge of COBOL is essential; background in data base systems and experience with the DEC System 10 would be an added plus.

Telemed provides a challenging and stimulating environment for professional growth, with the latest in computer technology and information systems. Business applications development is done on an in-house DEC KL-10 Timesharing system, with your own CRT for on-line program development. These positions offer an opportunity to interface with top corporate management and propose solutions to real problems, Salary will be commensurate with your background, experience and potential contribution to the company.

Send your resume or a letter detailing your experience, in complete confidence to:

Software & Professional Recruitment Center

TELEMED CORPORATION

2345 PEMBROKE AVENUE
HOFFMAN ESTATES
ILLINOIS 60195

An equal opportunity employer

CUSTOMER ENGINEER

UNIVERSITY OF WYOMING

Candidate must have 2 years Microdata experience, 3 years general computer maintenance plus some knowledge of communication and peripheral equipment. Travel is required to junior college sites throughout the State of Wyoming. Reply by July 1, 1978 to Personnel Office, Box 3422 University Station, Laramie, Wyoming 82071. The University of Wyoming is an affirmative action, equal opportunity employer.

Programmers, Analysts, Software Specialists

We are Specialists Too!

We can put you in touch with openings from coast to coast regardless of geographic preference. Contact the nearest NPA affiliate listed below for confidential service. All fees employer paid

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Los Altos, CA 94022
(415) 941-3200**

**COMPUTER CAREERS INC.
Specialists-DP
4720 Montgomery Ln. #503
Bethesda, MD 20014
(301) 654-9225**

**D. BROWN & ASSOCIATES
Dorothy Spiegel
DP Specialist
610 S.W. Alder, Suite 711
Portland, OR 97205
(503) 224-6660**

**SUPERIOR RESOURCES
16400 Ventura Blvd.
Encino (L.A.), CA 91436
(213) 986-4400**

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An international leader in energy management computer systems

To investigate your career with an established growth company call anytime 24 hours a day including Saturday and Sunday (215) 643-2000, Ext. 8762 or send your resume to: Jim Henderson, Manager of Professional Employment, Systems Group, Dept C-26

LEEDS & NORTHRUP
Dickerson Road—North Wales, Pa. 19454
Equal Opportunity Employer, M/F/H

SYSTEMS PROGRAMMER

New position with full responsibility for all systems programming including DOS/VS, interactive programming and system tuning on our IBM 370/135 system. Salary starting at 15K with 21 days vacation and other excellent fringes. Applications received by June 30, 1978 guaranteed consideration. Contact Personnel Office, Moraine Valley Community College, 10900 S. 88th Ave., Palos Hills, IL 60465 (312) 974-4300. Equal Opportunity, Affirmative Action, Title IX Employer.

PROGRAMMER

Expanding facilities for new on line applications creates this position, requires COBOL and some CICS applications. Equipment is 370 125

Kingsbury is the leader in special purpose machine tools. Excellent location, pay, and benefits including flexible working hours

Send job and salary history to:

Roger W. Hetherman
KINGSBURY MACHINE TOOL CORP.
90 Laurel St.
Keene, NH 03431

PROGRAMMERS

MIDWEST

Current openings for programmers with 1-2 years in Cobol in IBM environment, CICS or IMS a plus. Salary 15-19K. Send resume in confidence to:

SEARCH E.D.P., INC.
P.O. Box 8032
Cin., OH 45208

Systems Analysts Programmers

If responsibility, career advancement and personal recognition are your objectives...

WE COULD EXCEED YOUR EXPECTATIONS

We are an international public accounting firm expanding our computer auditing research and development staff. Excellent career opportunities are available for data processing professionals who desire challenging and diverse assignments.

Positions are currently available at our New York City headquarters for bright, ambitious, highly motivated individuals with the following skills:

- **COBOL**
  Minimum of 4 years programming and systems analysis experience. At least 2 years of COBOL programming.
- **MINICOMPUTERS**
  Minimum of 4 years programming and systems analysis experience. At least 2 years experience on business applications involving minicomputers (e.g., DEC, Data General, Varian). Additional experience on small business computers (e.g., IBM System/3) is a plus. Working knowledge of RPG. Working knowledge of COBOL.

A successful candidate will have a college degree, plus the ability to interact and communicate effectively

Please submit your resume, including qualifications and salary history, in confidence to:

Mr. Lawrence N. Fein, Dept. 626CW (19th Floor)
277 Park Avenue, New York, N.Y. 10017

An Equal Opportunity Employer M/F

DIRECTOR OF DATA PROCESSING CENTER

(Anticipated) Master's in BDP or related discipline. Three years' experience in management/administration. Minimum two years' experience in programming and systems analyst. $19,500 - 24,500. Effective August 1.

BUSINESS DATA PROCESSING ASSISTANT PROFESSOR

(Anticipated) Master's in BDP or related discipline; 3 years' BDP teaching and/or BDP industrial work experience. Effective August 28, 1978.

Send resume by July 12 to Jane C. Frank, Affirmative Action Officer, Berkshire Community College, Pittsfield, MA 01201

Equal Opportunity Employer

PACIFIC NORTHWEST

Our client, a leading manufacturer, is seeking several **SYSTEMS PROJECT LEADERS** - who will design, implement and modify business systems needed for essential operations in rapidly expanding reorganization. We are seeking strong professionals with on-line systems experience primarily in manufacturing, financial or distribution applications.

TECHNICAL SUPPORT - seeking expertise in the following: IBM 370/OS/VS-1/MVS; TSO or VM/CMS; IMS;DL-1 and CICS. Individual selected will support new IBM installation.

Compensation and benefits are excellent. We also have career opportunities for analysts and programmers for manufacturing, banking and retail applications.

Call in confidence or send resume including salary history to Al Friedman, (206) 455-8300, Executive Resources, Inc., 310 108th Ave. NE, Bellevue, WA 98004.

DIRECTOR of INFORMATION SYSTEMS

The Director will have overall responsibility for the planning, administration and control of the Information Systems group. With a staff consisting of thirty people, this group designs, develops and maintains automated university administrative systems.

Minimum qualifications include a Bachelor's Degree plus ten years of data processing experience; five years of management or administrative experience in a major data processing center, preferably at an institution of higher education; extensive experience at a working level in systems analysis and programming.

Salary level depends on qualifications, but minimum salary will be $26,000.

Letters of application are requested by July 15, 1978, and should be sent to: William E. Walden, Associate VP for Computer Services and Information Systems, 2701 Campus Blvd., N.E., University of New Mexico, Albuquerque, NM 87131. An Equal Opportunity, Affirmative Action Employer.

Univer. of N.M.-June 26

PROGRAMMER ANALYST

WORK IN SUNNY SOUTH FLORIDA!

Candidates must have minimum 4 years experience as Programmer Analyst. Must be proficient in COBOL and BAL. Degree preferred.

This position immediately available on Florida's beautiful east coast. Year 'round fishing, boating, swimming and golfing. Excellent pay and fringe benefits. Send resume in strict confidence to:

Employment Supervisor
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Vero Beach, FL 32960

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PIPER

DATA BASE SYSTEMS ENGINEER

Immediate opening in a data base systems support group working with DMS-1100 and QLP-1100 installed on a UNIVAC 1100-42 state computer center system. Position requires degree plus 2-4 years experience. Additional experience can substitute for college education. EXEC 8 and DMS-1100 experience highly desirable.

Send resumes to: Bobbie Hughes
Dept. of Computer Services
618 8th St. Office Bldg.
Richmond, VA 23219
EOE/M-F

SYSTEMS PROG

Major firm offers growth oppty to indvl with CICS Assembler bkgd from lg 370 ship $22K+DOE

SYSTEMS ANAL

You will coordinate lg teleprocess network if you have IBM Assembler TCAM bkgd $26,000

Many other Prog, Prog Anal, Syst Anal and mgmt positions avail for EDP pros seeking upward move. All fees/exp paid by client cos. Reply in strict confidence

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BUILD YOUR OWN STAFF

Salary Area $27,000

Our client, whose revenues have tripled in the last four years, has decided to convert to fully on-line systems. This position will report directly to top financial officers and will be responsible for tripling the size of the present data processing staff. The company is headquartered in an attractive suburban Houston location and has unusual growth prospects.

For further information, please contact Data Processing Specialist, Tom Fischer at (713) 658-9898.

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M. david lowe
PERSONNEL SERVICES

403 Houston Nat. Gas Bldg.
1200 Travis St.
Houston, TX 77002

Software Engineers

Opportunities For Engineers, Systems Analysts With SEL RTM O.S. Experience In North Suburban Pittsburgh

We have immediate openings for individuals with SEL 32 (SEL 86) RTM knowledge and skills. The responsibilities of the positions include providing RTM support, enhancement, and extensions for Westinghouse SEL 32 real time process control systems.

Positions require 3-7 years experience and operating system skills. An Engineering degree is recommended.

As a member of the Software Development group, you will be working with application engineers, providing consultation on RTM capabilities and producing RTM extensions needed for process control systems dealing with energy management, industrial processes and manufacturing systems. Openings are also available in these application departments for qualified individuals with RTM experience.

These are outstanding career positions offering an excellent income commensurate with your experience, a generous company-paid benefits package and outstanding opportunities for professional achievement and personal growth.

For immediate attention, please send your resume, including salary history to: Abe Abrams, Personnel Relations Administrator.

Industry Systems, Division, Dept. CW, 200 Beta Drive, O'Hare Township, Pittsburgh, PA 15238.

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Westinghouse

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- * **Major Division of a Fortune 500 Corporation**
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- * **Strong position in the electronics market**
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We've given you 5 strong reasons for taking charge of our MIS activities.

In addition, consider our state-of-the-art environment, and, most important of all, responsibilities which will fully match your technical and management skills.

Your involvement will include directing the activities of programmer analysts at divisional headquarters and at 3 operation centers across the U.S. Your area is part of a national network of RJE computers linked to centralized corporate Burroughs Computer. Duties will also bring frequent interface with corporate MIS management.

Requirements include a degree — MBA preferred — at least 8-10 years of systems programming experience in a large-scale operation including at least 4 years in a managerial capacity.

We'll provide a salary commensurate with education and experience plus excellent benefits. You'll also have the opportunity to continue growing within an organization where the contributions of talented systems professionals are valued. Find out more by sending your resume and salary history to:

CW Box 1563, 797 Washington St., Newton, MA. 02160
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PROGRAMMERS AND ANALYSTS

Free Employment Service
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Scientific and commercial applications ● Software development and systems programming ● Telecommunications ● Control systems ● Computer engineering ● Computer marketing and support

Call or send resume or rough notes of objectives, salary, location restrictions, education and experience (including computers, models, operating systems and languages) to either one of our locations. Our client companies pay all of our fees.

RSVP SERVICES, Dept. C
Suite 700, One Cherry Hill Mall
Cherry Hill, New Jersey 08002
(809) 887-4488

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RSVP SERVICES
Employment Agency for Computer Professionals

SENIOR PROGRAMMER ANALYST
Colorado

Hewlett-Packard in Loveland, Colorado has an opening for an experienced Senior Programmer Analyst. Specifically, we desire someone to help implement software systems on the H-P 3000 Series computer in a high technologically integrated circuit area. The position will involve both programming and system analysis. Qualifications include COBOL/Data Base knowledge, plus 5 years experience and BS in computer science (or equivalent) and an ability to get the job done.

Hewlett-Packard offers excellent working conditions and fringe benefits, including profit sharing, flexible work hours, etc.

For confidential consideration, please send your resume to: Ms. Kethi Kline, Personnel Department, Hewlett-Packard Company, P.O. Box 301-B, Loveland, Colorado 80537.

We are an equal opportunity employer dedicated to affirmative action.

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COMPUTER SCIENCE PROFESSIONALS

MEET THE CHALLENGE WITH GULF

Build a meaningful career in southwest Houston at Gulf Oil's newest and most advanced computer complex. Gulf Science & Technology, one of the operating companies of Gulf Oil, offers an excellent benefit package and competitive starting salaries for ...

APPLICATIONS PROGRAMMERS

These positions offer the qualified data processing professionals challenging work assignments in a state of the art computer complex. These positions also offer outstanding potential for career growth and advancement for the person who is willing to meet the challenge.

Prerequisites include a degree in Computer Science or related field, and 2-5 years experience in commercial applications programming using COBOL in a 370/OS-VS or MVS environment. Good working knowledge of IBM JCL and experience with IMS, TSO, and VSAM a definite advantage

Salaries will be commensurate with education and experience. Qualified applicants are invited to submit their resumes including salary history to.

Gulf

Mr. J.P. Haney
GULF SCIENCE & TECHNOLOGY CO.
Drawer I-71
P.O. Box 36506
Houston, TX 77036

An Equal Opportunity Employer M/F

Data Processing Professionals

San Francisco Bay Area

Fireman's Fund, a leader in the Insurance Industry, is seeking talented EDP professionals to join us in our modern Computer Center where the latest state-of-the-art facilities exist (including our advanced three 370/168's MP MVS systems). Openings are available in the following areas:

Systems Programmers

Positions require 3 years' Systems Programming experience, strong ALC skills, and a good understanding of MVS and systems 370 concepts. Experience in MVS internals, SMP, measurement and tuning, dump analysis, design and implementation of system software highly desirable.

Sr. Programmer/Analysts
-Advanced Systems

STANDARD DEVELOPMENT - positions require 2-6 years' total EDP experience with meaningful background in two or more of the following:

(1) Systems development methodology
(2) Automated documentation operators
(3) TDDD & IPT's
(4) Internal consulting (with user & technical personnel)
(5) Data-base inquiry facilities
(6) Regression testing methodology
(7) Software evaluations
(8) EDP Standards and systems assurance

These positions are in a creative, innovative atmosphere and require the following - excellent communication skills, COBOL (shop language), PL/1, and/or MK-IV, TSO and/or Superwylbur.

Programmer/Analysts
-Applications

2-4 years' recent COBOL programming experience required. IBM OS preferred, but not required. Responsibilities include design and programming of various financial and insurance-related systems. Both new programming and enhancements.

If you are interested in pursuing a career in a progressive environment where your talents will be recognized and utilized, please call collect (415) 485-5096 weekdays, 8 AM to 5 PM Pacific Daylight Time, or send your application and salary requirements to Deve Norris, Employment Representative, Dept. CW-1, 1500 Los Gamos Drive, San Rafael, California 94911. We offer excellent benefits and a generous relocation policy.

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Insurance Companies

An affirmative action/equal opportunity employer m/f/h.

DIRECTING THE FUTURE

Miniperipherals Product Planner

A Miniperipheral/Terminal position of Control Data has outstanding career opportunities for experienced product planners in the computer terminals and miniperipherals field. The product planners will use their technical background and familiarity with terminal equipment and miniperipheral equipment to evaluate products and markets and to identify marketing opportunities for the division. Through their recommendations the product planner will have a significant impact on the future products of the division. Prior product planning experience or product management experience in the terminals of miniperipherals field is required. If you are interested in directing our future as well as your own call Tom Peluso (612) 482-4458 or send resume to:

CONTROL DATA CORPORATION
2401 North Fairview Avenue
Roseville, MN 55113

CONTROL DATA CORPORATION

COMPUTER PROFESSIONALS

The Reuben H. Donnelley Corporation, a Dunn and Bradstreet Company, is seeking dynamic leaders for participation in the continued development of a highly mechanized publishing system. This system will be utilized in the marketing, publishing, and distribution of telephone directories within the Illinois/Cincinnati area from the Regional Data Processing facility located in Terre Haute, Indiana. The continued growth and achievement of Data Processing has created three immediate opportunities for experienced individuals. Reuben H. Donnelley offers outstanding opportunities for further professional achievement and personal growth within our entire organization. An excellent fringe benefit program is available including profit participation. Degree desired but not essential. Salary commensurate with experience. Positions available include:

PROJECT MANAGER - Opportunity for the individual with previous managerial and extensive systems analysis experience.

DATA BASE/DATA COMMUNICATIONS MANAGER - Opportunity for individual with practical experience in data base systems design in a communications oriented environment

ANALYST/PROGRAMMER - Opportunity for the individual with previous systems analysis and programming experience.

For immediate attention, please submit your resume with salary history in confidence to:

R.A. Slover
Area Personnel Manager
THE REUBEN H. DONELLEY CORPORATION
66 South First St., P.O. Box 720
Terre Haute, Indiana 47808
An Equal Opportunity Employer M/F

TELEPROCESSING SPECIALIST

Nationwide steel distributor has opening for individual with proven track record in teleprocessing. We operate in a DOS/VS 148 environment, running BTAM and CICS.

Require candidates with systems programming and remote 3270 experience, and a thorough understanding of protocalls and data network structures.

Successful applicant will have technical, PLUS oral and written communications skills to interface with vendors and contribute toward MIS Department long-range growth goals.

Excellent fringe benefits and salary commensurate with experience. Send resume, including current salary, to:

FOSTER L.B.FOSTER COMPANY
415 Holiday Drive
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COMPUTER & MANAGEMENT SYSTEMS SPECIALIST

Prominent Washington-based natl. trade assn. requires leader to conduct member activities in mgt. science and manufacturing control areas. Must be degreed. Min. 5 yrs. computer applications exper.; RPG II exper. helpful. Writing and documentation abilities a must. Should be aware of and able to convey significance of developments in computer field. Exciting work in a growing, enthusiastic environment. Salary upper $20's. Send resume and salary desired in confidence to: Graphic Communications Computer Assn./PIA, 1730 N. Lynn St., Arlington, VA 22209.

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programmer analyst

UNUSUAL OPPORTUNITY

to make important contributions in developing and programming new companywide systems in an expanding EDP department. Will eventually supervise other programmers.

Requires proven experience in complex accounting applications in an ON-LINE COBOL system. Career opening with excellent compensation and employee benefits. Send resume with salary history to Personnel Dept.,

ASSOCIATE METALS & MINERALS CORP.

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ELECTRIC POWER CONTROL - SOFTWARE ENGINEER

Prominent West Coast utility has a vacancy for an Engineer with a background in power control center software applications. Assembly language and Fortran programming experience for SCADA and AGC is required. Degree in engineering or related field is also required. Desire experience in advanced application programming such as Real Time Power Flow, Unit Commitment and Transaction Evaluation. Send resume and salary requirement to:

Employment Office

SAN DIEGO GAS & ELECTRIC CO.
P.O. Box 1831
San Diego, CA 92112
An Equal Opportunity/
Affirmative Action Employer

PROJECT LEADER SYSTEMS PROGRAMMER

Looking for a great career opportunity in sunny Miami Florida? Southeast Data Processing, Inc., an affiliate of Southeast Banking Corporation is seeking ambitious individuals to grow with an expanding company. If you have experience leading conversion from 2 158 UP's using OS/VS1 to MVS/MP 158's, then our excellent benefits, and career growth opportunities are for you. We would appreciate no agency correspondence. Send your resume and salary requirements to

Ms. Deborah Kellermann
1001 N.W. 7 St., Miami, FL 33136
Equal Opportunity Employer

SR. DATA BASE ANALYST/PROGRAMMER

Supervise programming of University data base management system. Sr. Analyst experience required. Data base experience desired. Excellent benefits.
Send resume to:
University of San Francisco
Personnel Office
2130 Fulton St.
San Francisco, CA 94117
Affirmative Action EOE

DATA PROCESSING OPPORTUNITIES
JEDDAH, SAUDI ARABIA

Whittaker Corporation, a leader in international health care services, has an immediate need for experienced data processing professionals in the following positions:

SENIOR ANALYST SYSTEMS AND PROCEDURES

There are two project team leader positions available:

(1) Material Management Information Systems
Requires a broad background in design and implementation of computer based systems for:
- Supplies catalogues
- Purchasing
- Inventory control and management
- Property control

(2) Finance and Personnel Information Systems
Requires a broad background in design and implementation of computer based systems for:
- Accounts payable
- Budgeting/general ledger
- Cost accounting
- Payroll and personnel

These positions require the ability to interface effectively with the user organizations and to implement the manual systems for data preparation, flow and control.

SYSTEMS ANALYST

There are two positions available

- 2 years experience as systems analyst plus 2 years as a computer programmer is required
- Material or financial systems design experience is desirable

COMPUTER PROGRAMMER

There are two positions available:

- 3 years experience using RPG II in an IBM environment is required

For all the positions listed above:
Experience with a multiple-facility health care systems would be advantageous.

Experience with IBM 370 hardware and software capabilities is required including:
- DOS/VS power
- RPG II

Benefits for these two year contract assignments include a competitive salary, medical and life insurance, exciting travel opportunity as well as furnished living accommodations.

For further information & confidential consideration, please forward your current resume with salary history to:

TEMPLE CANNON, Sr. Recruiter
International Recruiting

Whittaker

LIFE SCIENCE GROUP
10880 Wilshire Blvd., Suite 604
Los Angeles, CA 90024

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DUNHILL EDP talks YOUR LANGUAGE

You are currently needed and wanted for immediate nationwide EDP opportunities

Programmer-CPCS-3090 Mach	$23K
Software Systems-IBM-MVS	$25K
Senior Programmer/Analyst-EFTS-COB-ALC	$20K
Programmer/Analyst-DBMP-DOS/VS-COB	$20K
IMS Specialists-DB/DC, DICT, TUNE, GEN	$25K
Senior/Analyst-Oil-Gas-All Types	$25K
Analyst/Software-ALC, PARS, FINANCIAL	$18K
Programmer-8000-FORT-ASM-MICRO	$25K
Prog/Analyst-Heavy Bank, OS/DOS, VS, COB	$20K
Programmer/Analyst-INTERCOMM/DATABASE	$21K
Programmer/Analyst-Bank-Loans	$20K

Rush your resume including salary history to: TED A. LEHR, EDP Specialist-DUNHILL EDP, 22 E. Mitchell Dr., Phoenix, AZ 85012 . . . or call (602) 264-1166 . . . Company inquiries are also invited . . . 100% EMPLOYER RETAINED . . . Member of DPMA and ASM.

DIRECTOR INFORMATION SERVICES

To plan, organize and direct the increasing activities of technical staff of a rapidly-growing, non-profit library services organization.

Activities include:

1) hiring and supervision of staff growing from 4 to 12 in next year; 2) operation of data center serving 180+ institutions; 3) telecommunications support of services received via associated high-speed network of 2100+ terminals; 4) planning, development and implementation of self-operated network, with Atlanta-based data center as hub, as a leading member of an emerging nationwide network

Qualifications include:

1) 8-10 years of solid data processing experience in medium to large scale computer environment; 2) demonstrated management capability of development of large data base-oriented, online applications system; 3) personal communications ability for frequent interaction with leaders in international library and information services community

This southeastern membership organization offers competitive salary, comprehensive benefits, relocation assistance, interesting and challenging environment and outstanding living and recreational opportunities

Send resume with references and salary history by July 5 to: Personnel, Suite 410, 615 Peachtree St N E, Atlanta, GA 30308

SOLINET

**the Southeastern
Library Network**

An Equal Opportunity Employer

Sargent & Lundy, a prestigious engineering consulting firm founded in 1891 and presently employing 4,000, seeks additions to its EDP staff. You will be part of a first-rate team of data processing professionals, and work in close alliance with other programmers and systems analysts on a project basis.

Programmers

COBOL

To qualify, you should have a sound background in creative programming, testing, debugging and documentation of management information systems. Familiarity with third generation operating systems will enhance your qualifications.

Systems Analysts

COBOL

Seeking experience in computer-oriented systems design, including flow charts, files, data bases, on-line systems design, telecommunication support and file structuring. A college degree with solid systems design experience will qualify you.

Qualified candidates will be offered the opportunity for career growth and advancement within a technically dynamic EDP environment, as well as excellent compensation, benefits, and modern working conditions at our new Chicago Loop offices. For prompt, confidential consideration, submit resume or write letter, outlining your background and salary history, or call (collect)

K. Chadwick (312) 269-3572

**SARGENT & LUNDY
ENGINEERS**

55 E. Monroe Street
Chicago, Illinois 60603

An Affirmative Action Employer M/F

**DTSS Incorporated
requires**

TECHNICAL REPRESENTATIVES

We need experienced computer marketing and programming personnel to provide technical support for The Dartmouth Time-Sharing System.

Duties include client visits and sales presentations as well as installation and support for new systems. This is an exciting opportunity to develop a career while living in a rural area. Job includes moderate travel in the US and abroad.

Required qualifications are experience with major computing languages and excellent oral/written communication skills. Familiarity with DTSS is a big plus, as is familiarity with other major computer systems. Bachelor's degree preferred. Salary commensurate with experience.

Send resume to:

**Michael R. Vitale, Director of Marketing
DTSS INCORPORATED
P.O. Box 799, Hanover, N.H. 03755**

GROW WITH US...

If you are looking for a place to work where each day presents new challenges and there is no limit to your ability to learn and earn, consider American Management Systems.

SYSTEM PROGRAMMERS

We need systems professionals who have experience in using:

- MVS, MVT, VSI
- JES2, HASP
- CICS, IMS, WYLBUR, TSO
- VM, CMS

We are especially interested in funding two senior systems programmers: one who can take charge of planning and carrying out a conversion from OS to MVS; and the other who can plan and carry out the installation of IMS DB/DC. These two positions are in the AMS Computer Center in Arlington, Virginia which is in the Washington, D.C. metropolitan area.

SYSTEMS SOFTWARE/ TELECOMMUNICATIONS EXPERTS

To work in the design and development of very large scale systems on IBM computers. Work will include selection of software packages; data base design, development of systems standards; analysis of database security restart/recovery, hardware/software performance, and telecommunications networks. We are especially interested in finding senior data base design experts - some with experience using IMS DB/DC and others with experience using ADABAS and CICS. These positions for senior experienced professionals are available in our Washington, D.C., New York, Chicago and Detroit offices.

American Management Systems is a management consulting, software products and computer services firm founded in 1970. In 1977 our sales were $21 million, in 1978 we will reach $30 million. We have sustained this growth by attracting and keeping highly motivated people who are good at what they do and thrive in an atmosphere that rewards a commitment to excellence.

If this sounds like your kind of firm, let us hear from you. We pay top salaries, have a competitive benefits package, and pay your relocation costs. Send resume and salary history to:

ams

American Management Systems

**Judith D. Ross
Director, Professional Recruiting**

Department A

**1515 Wilson Boulevard
Arlington, VA 22209**

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EDP PROFESSIONALS

at ITT Grinnell

Exceptional opportunities to participate in the development of a new corporate data center utilizing an IBM 370/3031 (OS-VS 1)

World leader in sophisticated piping products and systems with current business in excess of $500 million, ITT Grinnell looks confidently forward to continued business success. To keep pace with the company's demonstrated vitality, we're expanding our EDP systems and facilities. In a climate of positive change and growth, we seek specialists qualified for the following positions.

Systems Programmer

To install and maintain existing applications on a 3031 system and to develop software capabilities for future DP needs. Will establish standards for use of software system and evaluate system efficiency and productivity. Requires minimum 6 years experience including 3 years systems programming in an OS-VS 1 or MVS environment. Should be familiar with communication systems.

Systems Analyst

To analyze information for developing and modifying systems applications. Must be able to work closely with company personnel to gather information, solve problems and define systems objectives. Designs applications and guides their installation. Requires 6 years DP experience including 3 years COBOL/OS programming/analysis experience.

Programmer Analysts

To design and test program logic, code programs and prepare them for computer operation. Assist in establishing file requirements and processing specifications and prepare documentation of completed programs. Opportunity to advance into systems programming. Requires 3 years COBOL programming experience.

Positions based at our Providence, R.I, headquarters. Salaries and benefits excellent. Reply fully stating salary history and indicating position of interest, in confidence to: Sherry Bearse, ITT Grinnell Co., 260 West Exchange Street, Providence, R.I. 02901.

or call collect (401) 831-7000, Ext. 518

ITT Grinnell

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Programmer/Analysts

BAL, COBOL, or PL/1 experience necessary

CHANGE GEARS...

In a relaxed
Rocky Mountain University Community
No Commuting ... Informal Atmosphere

SHIFT UP...

to an expanding, respected international service company

IBM 158 AP/3033, OS/MVS/TSO, RAMIS mini-computers, interactive systems, optical scanning, large scale file maintenance. Experience in market research, direct mail, subscription fulfillment, statistical analysis, or name and address processing desirable, but not required.

Starting salary from $12,000 - $18,000, depending on qualifications and relevant experience. Relocation expenses paid. For further information, please call:

800-525-2246 (toll free)
between 7am & 6pm (MDT)

NEODATA SERVICES

a division of A.C. Nielsen Company

An Equal Opportunity Employer M/F

SYSTEMS PROGRAMMERS

Transamerica Information Services, a major state of the art data processing organization located in Los Angeles has career opportunities available for highly qualified professionals.

MVS SYSTEM PROGRAMMER

Primary duties will include SCP maintenance, PUT and SU installations, SYSGEN, IBM PSR interface, and problem determination & resolution. Position requires comprehensive system programming & operating experience with large processors, MVS, JES 2, TSO, SMP service aids, debugging & VSAM. Knowledge of 168MP, and of subsystems designs and conventions helpful.

SR. SYSTEMS PROGRAMMER

Senior level Systems Programmer required with CICS or other large teleprocessing monitor experience and a working knowledge of MVS, JES 2 and TSO. Expertise with EP VTAM/NCPnd TCAM helpful. Responsibilities will include debugging and tuning CICS, generating and maintaining JES 2, performing TSO support activities, and conducting associated evaluations and recommendations. Will assume project leadership responsibilities.

We offer outstanding opportunity for professional development, excellent compensation, and rewarding futures. Please forward resume including salary history for confidential consideration.

PERSONNEL B-300
1149 South Broadway
Los Angeles, CA 90015

Transamerica
Information Services

Equal Opportunity Employer

PROGRAMMER/ANALYST
$25,000
GO WITH THE BEST...
SYSTEMS & COMPUTER TECHNOLOGY AT THE UNIVERSITY OF ALASKA

We're SCT, a recognized expert in providing EDP systems and computer center management to colleges, universities and local government throughout the USA. Opportunities for career growth and advancement are very strong within the company. Right now an excellent opportunity is available at the University of Alaska Computer Network (UACN) to participate in the development, expansion, and enhancement of a variety of applications systems.

This position requires a degree and 2 years of systems development experience using COBOL. Additional specific experience in the following is desirable: University Systems, Financial Systems, Honeywell (GCOS) and on-line applications.

In addition to an excellent salary in the mid-twenties (including cost-of-living adjustment), we offer a complete benefit package which includes company paid vacation. CALL COLLECT:

Manager Administrative Systems
907/479-7666
Monday-Friday, 12Noon-9pm (CDT)
Or send resume to:

SYSTEMS & COMPUTER TECHNOLOGY CORPORATION

P.O. Box 95101
Fairbanks, Alaska 99701

An Equal Opportunity Employer M/F

Illinois Board of Higher Education

Data Base Manager

FUNCTION: The Data Base Manager is responsible for file structures, data dictionary, access controls, performance and maintenance of the Illinois Board of Higher Education data base.
SALARY: Upper Teens to Lower Twenties, depending upon experience and qualifications.
BACKGROUND: Working experience with IMS Data Base Management System required. Programming experience in COBOL is preferred; experiences with OS/JCL and report generators (e.g. EASYTRIEVE), would be helpful.
AVAILABILITY: This position is available immediately; applications should apply before July 7, 1978 to:

Dr. James J. McGovern
Illinois Board of Higher Education
4 West Old Capitol Sq.
500 Reisch Bldg.
Springfield, IL 62701
(217) 782-2551
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Equal Opportunity Employer

DIRECTOR - MIS

Our client is a manufacturing organization in need of director who has worked his way up through programming and analysis and has experience in running computer operations and establishing controls. The successful candidate comes from a high volume OEM type product company. His is a manager first, and bottom line oriented. The position is at corporate in Chicago with a starting salary up to 35K and profit sharing and 10% bonus. Call (305) 358-9290 or send resume to Michael Rottblatt, Ott, Hertner & Assoc., 1401 Bricknell Ave., Suite 603, Miami, FL 33131.

HOUSTON

The fishing is great, the water skiing is great, etc., but all of that is immaterial. The important thing is that Houston's data processing market is great. This includes programmers, analysts, managers, scientific people, etc. Test the water by calling Jim Fleming COLLECT at (713) 961-3271 or send your resume to:

ROBERT HALF
PERSONNEL AGENCIES, INC.
4901 Woodway,
Suite 231W
Houston, Texas 77056

PROGRAMMER ANALYSTS

Join our centralized MIS function working with advanced hardware & software in our conveniently located central N.J. headquarters. Exp ranges from 2-5+ yrs. COBOL exp on IBM 370, DS/VS I & background in financial systems preferred. Degree in computer science or related degree an added plus.

We offer an attractive salary, a comprehensive package of fringe benefits, liberal relocation allowances & most importantly a high visibility position with exceptional opportunity for career advancement. Interviews can be arranged at your convenience. Forward a resume & current earnings to David Alai, Corporate Employment Manager. Agency replies accepted.

FEDDERS CORPORATION
EDISON NEW JERSEY 08817 U.S.A

An Affirmative Action and Equal Opportunity Employer

Illinois Board of Higher Education

Programmer-Analyst
(Research Associate)

FUNCTION: Aid in the analysis of data for the Board of Higher Education by writing computer programs to summarize and integrate data files.
SALARY: Mid to Upper Teens, depending upon experience and qualifications.
BACKGROUND: Applicants should have knowledge of DS/JCL and COBOL. Experience with IMS and EASYTRIEVE is helpful.
AVAILABILITY: This position is available immediately; applicants should apply before July 7, 1978.

Dr. James J. McGovern
Illinois Board of Higher Education
4 W. Old Capitol Square
500 Reisch Bldg.
Springfield, IL 62701
(217) 782-2551
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Equal Opportunity Employer

COMPUTER PROFESSIONALS

Computer Management with Sunmark Industries

Sunmark Industries, a subsidiary of Sun Company, Inc., is involved in the marketing of wholesale and retail petroleum and automotive products, in the eastern United States. Presently, our Finance and Systems Department, located in center city Philadelphia, has need of two high level, ambitious computer professionals.

DIRECTOR
Information & Computer Systems

Will be recognized as the primary source of computer expertise and budgetary control. Will be responsible for the overall coordination and consolidation of separate systems and data processing efforts being conducted by Sunmark. The successful applicant will have major impact on the development of short and long range system plans, the maintenance and improvement of existing systems for financial control and decision-making needs.

To qualify, the candidate must have top level experience in managing EDP systems organizations and their key functions, plus a proven distinguished background in administrative and technical supervision. Must be able to deal with top level management. Salary to $40,000.

MANAGER
Systems Operations

This position will have overall responsibility for the management, control, maintenance and data base administration of Sunmark's hardware, software, vendor contracts, security, training and user consulting. In addition, the position requires establishing system standards and auditing compliance; designing modifications for present systems to improve efficiency and satisfy infomration needs and conducting supervision of an Analyst Staff and some outside vendors.

Position qualifications will include a proven background in systems management with an emphasis on up-grading systems efficiency and cost savings for employer, the ability to balance and satisfy user needs, integrate systems and set priorities. Salary to low $30,000.

As a subsidiary of Sun Company, Inc., Sunmark can provide excellent opportunities for career development and professional satisfaction plus excellent corporate benefits. Interested applicants should send their resumes, including salary requirements, in confidence, to: Z-95, P.O. Box 2069, Philadelphia, PA 19103.

SUNOCO DX
SUNMARK INDUSTRIES

A Division of Sun Oil Company of Pennsylvania.

An Equal Opportunity Employer, M/F

DIRECTOR OF TECHNICAL SERVICES

Indiana University Purdue University at Indianapolis

The 22,000 student IUPUI campus in Indianapolis, serving both Indiana and Purdue Universities - is looking for a highly qualified data processing manager to assume responsibility for the direction of its Technical Services Department.

Technical Services has full responsibility for all systems software on the three academic mainframes at the Indianapolis Campus: DEC 1090 with 512 K words of memory and 800 MMBytes of disk storage, IBM 370/125, and 360/44. All three systems are used for instructional and research computing, with some administrative applications. The 370/125 is used for operating systems instruction and, as such, runs DOS/VS, OS/VS1, and VM/370. Technical Services includes groups specializing in statistical and mathematical programming, operating systems, telecommunications, consulting, and software systems, with a staff numbering about twenty.

The Indianapolis computers are part of the Indiana University Computing Network and are connected to a 370/158 AP running MVS and a CDC 6600/CYBER 172 multimainframe complex, as well as to a large number of small computers.

The Director of Technical Services plays a vital role in coordinating computing activities throughout the campus and in consulting on computing needs for research projects. To meet the challenge of this position, the Director should have at least six years of experience in increasingly responsible positions, including three years in a supervisory position. He or she should be a strong manager with strong communications skills, and an excellent background in systems programming. This is a high visibility position within the University, and requires heavy interaction with faculty and administrators. Academic experience and an advanced degree are highly desirable

This postion offers considerable challenge and potential for success. Fringe benefits are excellent, including four weeks vacation and eleven paid holidays, with starting salary to $26,000 for a qualified individual.

Please submit resumes to:

Ms. Phyllis Gootee
Personnel Department
1100 West Michigan Street
Indianapolis, Indiana 46202

DATA PROCESSING

EDP

Professionals
Positions S.E. & Nationwide

Supervisor - Systems Programming	$30,000
Ds Systems Programmers	$23,000
Data General/FORTRAN Analyst	$24,000
BAL Programmers	$19,000
COBOL Programmers	$19,500
D.P. Manager - 370/Retail	$25,000
D.P. Manager - MRP/MFG	$24,000
IMS or TOTAL Programmer	$21,000
DMS2/COBOL/B-6700 Analyst	$21,000
CICS On Line Analyst	$23,000

BAI, Limited
225 Peachtree St, NE
Suite 2010 Cain Tower
Atlanta, GA. 30303
(404) 581-0040
(EDP Recruiters - No fee or contract)

SYSTEMS PROGRAMMER

We are looking for a Systems Programmer to work on a 3031 at KMS FUSION, INC., a company in Ann Arbor, Michigan, doing laser fusion research.

The Computing Department is small and the work will be varied and challenging. You will be responsible for the computer operations, and will also maintain MVS. We are looking for someone with at least 3 to 5 years experience as a Systems Programmer on OS or OS/VS - This is not an entry level position.

Applicant should be familiar with Assembler, FORTRAN, COBOL, OS-JCL, and utilities, and should have performed a SYSGEN. You will also be working with CINCOM's "TOTAL", Speakeasy, TCAM/TSO, and graphics applications.

KMS FUSION offers excellent fringe benefits in a suburban university atmosphere. Starting salary is competitive and based on experience and ability.

Applicant must be a U.S. citizen and be able to obtain a security clearance.

Please send resume and recent salary history to:

KMS fusion, inc.

Director of Personnel
Code - SP
Box 1567
Ann Arbor, MI 48106

We are an Equal Opportunity Employer M/F

PROGRAMMER

FLORIDA OPENING

EMR, a manufacturer of high technology electronic equipment has an opening for a Programmer in our Data Processing Department. The successful candidate will have at least 3 years experience in a manufacturing environment with thorough knowledge of COBOL and RPG II on any IBM mainframe. Data based communications experience desirable.

We expect to double our hardware and communications capabilities as well as our programming staff within the next year. Our company offers an excellent compensation and benefit program. If you would like to join our growing team, please submit your resume and salary history to:

SANGAMO WESTON
Schlumberger

EMR TELEMETRY
PO BOX 3041
SARASOTA, FLORIDA 33578

We Are An Equal Opportunity Employer M/F

PROGRAMMERS

Here's your opportunity to participate In developing a major new Database/ Data communications system

Utilizing the most current techniques

Exciting and challenging career growth potential exists in our rapidly expanding installation. Your professional experience should include a record of accomplishment with increasing levels of responsibility. You should have an IBM 370 background, proficiency in ANS COBOL and strong business applications experience. Knowledge of database/data communications concepts would be a plus.

We offer attractive salaries and a complete benefits package which includes pension plan and tuition reimbursement. These are highly visible positions offering solid advancement.

If you would like to be part of this outstanding team and your background and qualifications are equal to the challenge, we'd like to hear from you.

For immediate consideration, rush your resume including salary history to:

Mr. J. Chiaro

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Change Bridge Road
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Dell

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Powerful growth prospects... full-range of NCR mainframes...

San Diego living!

Want the stimulation inherent in developing a brand new generation of small to large total computer systems? Want exceptional visibility in one of the biggest, most far-reaching pioneering efforts ever undertaken by a major computer manufacturer? Want southern California living at its best? Join us!

At NCR's award-winning facilities in San Diego you'll have a chance to "do it all". We're developing new systems architecture, and integrating controllers, memories and software for the most powerful family of processors we've ever built. You'll be breaking new ground. You'll have wide open career paths, and all the growing room you'll ever need.

And you'll have the San Diego lifestyle. Seventy miles of beaches from San Clemente to the Mexico border. One of California's most sophisticated cities. Sixty-five golf courses; major colleges and universities; and showcase computer facilities on a 114-acre site north of San Diego in Rancho Bernardo.

It all adds up to powerful reasons why—if you have experience in one or more of the following areas—you should contact us at once.

SOFTWARE PROGRAMMER ANALYSTS

- Distributed Network Architecture, Transaction Processing, Interactive Processing
- Operating Systems and Compiler Development, Data Base
- Firmware, Diagnostic Programming
- Performance Measurement and Analysis

HARDWARE ENGINEERS

- Design Automation, Memory Devices, Logic Design, Test Systems
- Components (Semiconductors), Product (Electro-mechanical)
- I/O Subsystems, Integration, Configuration
- MICR/OCR/OMR Engineering

Send résumé and salary history to:
Professional Placement Department,
Engineering and Manufacturing,
NCR Corporation, 16550 W. Bernardo
Drive, San Diego, CA 92127.

Meet our technical representatives in these cities. To arrange a convenient interview in advance, call George Rice (collect) at **(714) 485-2153.**

Boston	June 18 & 19
San Francisco	June 23 & 24
Chicago	June 23 & 24
Detroit	June 25 & 26
Dallas	July 7 & 8.
Houston	July 9 & 10
Milwaukee	July 14 & 15
Minneapolis	July 16 & 17
Philadelphia	July 21 & 22
Washington, DC	July 23 & 24

NCR
Complete Computer Systems

An equal opportunity employer

DATA PROCESSING PROFESSIONAL

San Francisco Bay Area

Data processing subsidiary of expanding Bay Area bank located in Walnut Creek (25 miles west of San Francisco) seeks a professional to participate in, lead and support banking application projects. Responsibilities include project management, interfacing with software and hardware packages for general use and user liaison. Should be familiar with IBM hardware, DOS/VS, COBOL and BAL. Banking application experience preferred.

Benefit package includes company paid profit sharing, life and disability insurance programs. Comprehensive medical/dental insurance available at nominal cost.

Please send resume including salary history to:

Keren L. Dixon
Vice President/Personnel Mgr.

SECURITY NATIONAL BANK
1500 Newell Ave.
Walnut Creek, Ca. 94596
(415) 944-6104
EOE.

WANTED: NATIONWIDE

REPUTABLE EDP RECRUITMENT PEOPLE

The Computer Talent Source is an EDP recruitment and placement network comprised of several established firms who share a belief in high ethics and morals as well as effective service to the EDP industry.

We are now inviting others who share our beliefs, and enjoy ethical reputations in their market areas, to consider the substantial benefits of an association with us.

the Computer Talent Source

THE DPCenter
4615 Southwest Freeway, Houston TX 77027
713-960-9102

XAVIER ASSOCIATES
850 Rear Providence Hwy, Dedham, MA 02026
617-329-6280

McCORMICK & ASSOCIATES
386 N. York Rd., Elmhurst, IL 60126
312-530-1200

PROJECT MANAGER

DATA COMMUNICATION

ST. LOUIS LOCATION

Key new position created as part of major new data processing initiatives required to support corporate development and expansion programs. Excellent opportunity for leadership role in network communications design as part of the creation of distributed processing for a national chain of unique new consumer financial service centers.

We are looking for a self-directed individual with a minimum of 3 years' network design experience involving knowledge of data collection techniques and transmission methods. We are offering the excitement, challenge and reward of bold new data processing activities along with the solid backing of Citicorp and its resources.

We are tremendously excited about our data processing plan and think you will be too! For consideration, send resume or letter in confidence to: Mr. Paul Hetz, P.O. Box 21538, St. Louis, Missouri 63162

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SERVICES CORPORATION
A Subsidiary of Citicorp
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Programmers
Programmer/Analysts
Systems Analysts

Tired of routine type work? Looking for a challenging position including light travel, paid overtime and an exciting technical environment? If so DASD is for you. We are a national consulting firm with openings in all of our Eastern Region Branches.

We offer an attractive benefit package along with an exciting career opportunity. If you feel you qualify in any of the following areas

COBOL	ASSEMBLER
DBOMP	FORTRAN
BASIC	TOTAL/E1
RPG	PL/1
IMS	CICS

or

MINI-COMPUTERS
Please Send Your
Confidential Resume To:

DASD
PLYMOUTH PLAZA SUITE 205
580 WEST GERMANTOWN PIKE
PLYMOUTH MEETING,
PENNSYLVANIA 19462
215 – 828 - 7050

DASD CORPORATION

An Equal Opportunity Employer, M/F

Data Base Analyst

My client, a prominent Mid Atlantic $400 million division of a billion dollar corporation, has one of the most advanced Data Base programs in the country.

They seek a college graduate, 0-2 years experience (computer science and/or MBA a plus) with good analytical and verbal skills plus some knowledge of data base design.

Salary to $18,000, EXCELLENT promotional opportunity within near future and above average benefit package. Call or send resume IMMEDIATELY.

F-O-R-T-U-N-E
MANAGEMENT ASSOCIATES
SYSTEMS DIVISION
1528 Walnut St., Phila., Pa. 19102 (215) 546-9490

Programmer/Analyst

Data Processing

An immediate opening exists for a Programmer/Analyst in a progressive System/3 - Model 15D installation. Applicant must have a minimum of 2 years RPGII programming experience on the SYS/3. Manufacturing experience is desired. MRP, IPICS experience a plus. Excellent salary and fringe benefits. Send resume in confidence to:

J.R. Jones
Div. Mgr. Employee Relations
Boise Cascade Corp.
P.O. Box 914
Berryville, VA 22611
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SOFTWARE SPECIALIST II

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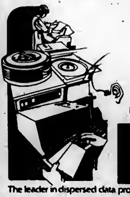

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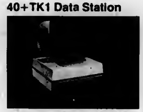

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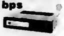
7200 bps 	**MODEM 4800/72** Dedicated line with optional multiport operation for up to three 2400 bps channels.	$6900 $165/mo.*	**$1995** **$80/mo.***
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1	Nova 3 Expansion-Chassis	2,000	1,700
1	Nova 3 32KW MOS Parity Memory	7,400	5,500
6	Nova 800 8KW Core Memory	3,200	900
6	Nova 800 4KW Core Memory	2,500	450
1	Keronix 8KW Core Mem. for Nova 1200	1,400	950
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2	4062 EIA Multiplexor	1,500	900
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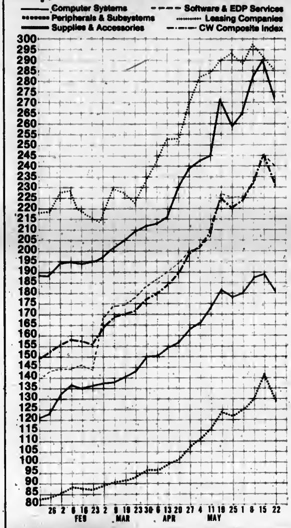

Earnings Reports

DATA DIMENSIONS
Year Ended Dec. 31

	1978	1977
Shr Ernd	$.24	$.62
Revenue	11,970,400	7,868,500
Earnings	163,400	479,900

ELECTRONIC DATA SYSTEMS
Three Months Ended March 31

	1978	1977
Shr Ernd	$.39	$.35
Revenue	56,964,000	43,352,000
Earnings	4,936,000	4,436,000
9 Mo Shr	1.10	.94
Revenue	156,063,000	115,502,000
Earnings	13,992,000	11,772,000

GENERAL DATACOMM INDUSTRIES
Three Months Ended March 31

	1978	1977
Shr Ernd	$.34	$.18
Revenue	7,509,000	4,726,000
Earnings	531,000	260,000
9 Mo Shr	64	32
Revenue	14,068,000	9,007,000
Earnings	992,000	470,000

MODULAR COMPUTER SYSTEMS
Three Months Ended March 31

	1978	a1977
Shr Ernd	$.32	$.11
Revenue	14,709,000	12,231,000
Disc Op Loss	....	28,000
Earnings	1,139,000	343,000

a-Restated to reflect discontinued operations.

PERTEC COMPUTER
Year Ended March 31

	1978	a1077
Shr Ernd	$1.17	$.78
Revenue	131,802,000	100,664,000
Earnings	7,183,000	4,657,000
3 Mo Shr	.36	.25
Revenue	35,972,000	26,084,000
Earnings	2,192,000	1,514,000

a-Restated.

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TRADE QUOTES

CLOSING PRICES WEDNESDAY, JUNE 21, 1978

All statistics compiled, computed and formatted by
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COMPUTER SYSTEMS

EXCH		PRICE 1977-78 RANGE (1)	CLOSE JUN 21 1978	WEEP NET CHNGE	WEEP PCT CHNGE
A	AMOANL CORR	22- 39	36 1/2	-2 1/4	-5.8
N	BURROUGNS CORP	55- 91	75 1/4	-3 3/4	-4.8
O	COMPUTER AUTONATION	19- 38	33	-4 1/2	-12.0
N	CONTROL DATA CORR	20- 36	32 7/8	-2 5/8	-7.3
C	CRAY RESEARCH INC	15- 46	37 1/4	-1 1/4	-3.2
N	OATA GENERAL COPP	35- 61	55 7/8	-4 3/8	-7.2
N	OATAPOINT CORR	18- 64	58 1/2	-5 3/4	-8.9
N	OIGITAL EQUIRNENT	37- 53	47 3/4	-4 1/2	-8.6
N	ELECTRONIC ASSOC.	2- 8	6 3/4	- 5/8	-8.4
A	ELECTRONIC ENGINEER.	8- 19	18 3/8	- 3/4	-3.9
O	EOUP-RHASE SYSTEMS	13- 32	29	-2 7/8	-9.0
N	FOXBORO	28- 54	36 1/2	-2 1/8	-5.5
O	GENERAL AUTOMATION	6- 19	17 5/8	- 7/8	-4.7
O	GRI COMPUTER CORP	1- 1	1 5/8	0	0.0
N	HEWLETT-RACPARO CO	62- 87	79 1/4	-4 1/2	-5.3
N	HONEYWELL INC	43- 59	56 3/4	-1	-1.7
N	IBM	236-286	268	-3 1/8	-1.1
O	MANAGENENT ASSIST	5- 18	14 1/4	-1 7/8	-11.6
O	MICPOOATA CORR	7- 18	17 1/R	+ 3/8	+2.2
O	MINI-COMPUTER SYS7	5- 12	5 1/4	- 1/2	-8.6
O	MODULAR COMRUTER SYS	5- 15	12 3/4	-1 3/8	-9.7
N	NCR	32- 58	54	-2 5/8	-4.6
O	PRIME COMRUTER INC	12- 32	28 1/4	-3	-9.5
N	PERKIN-ELMER	17- 26	23 3/8	-1 5/8	-6.5
N	RAYTHEON CO	16- 50	44	-5 3/8	-10.8
N	SPERRY RAND	30- 45	42	-1 5/8	-3.7
O	SYCOR INC	8- 24	23 1/2	- 1/8	-0.5
A	SYSTEMS ENG. LABS	5- 21	18 1/8	-2 1/8	-10.9
A	WANG LARS.	10- 26	22 5/8	-3 1/2	-13.3

LEASING COMPANIES

EXCH		PRICE 1977-78 RANGE (1)	CLOSE JUN 21 1978	WEEP NET CHNGE	WEEP PCT CHNGE
O	ALANTHUS CORP	3- 6	5	- 1/8	-2.4
C	BOOTHE COURIER CORP	8- 18	15 1/8	-1 3/8	-8.3
O	COMDISCO INC	9- 20	16 1/2	-2	-10.8
A	COMMERCE GROUP CORP	1- 3	5/8	0	0.0
A	COMPUTER INVSTRS GRP	1- 2	1 1/8	0	0.0
M	OATRONIC RENTAL	0- 2	1 1/2	- 1/8	-7.6
A	DCL INC	1- 4	3 1/4	- 1/4	-7.1
N	DPF INC	6- 15	10 3/4	-1 5/8	-13.1
N	ITEL	13- 27	24 3/8	-1 5/8	-6.2
N	LEASCO CORP	19- 35	30	-1	-3.2
O	LEASPAC CORP	1- 2	2 3/8	+ 5/8	+35.7
A	RIONEER TEX CORP	5- 11	6 3/8	- 1/4	-3.7
N	U.S. LEASING	10- 16	14 5/8	- 3/8	-2.5

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

SOFTWARE & EOP SERVICES

EXCH		PRICE 1977-78 RANGE (1)	CLOSE JUN 21 1978	WEEP NET CHNGE	WEER PCT CHNGE
O	ADVANCED COMP TECN	0- 2	1 1/4	- 1/8	-9.0
O	ANACOMR INC	7- 18	17 3/8	+1 3/8	+8.5
A	APPLIED DATA RES.	5- 16	14 1/2	-1 3/8	-8.6
N	AUTONATIC DATA PROC	23- 34	31 1/2	-1 1/2	-4.5
O	COLEMAN AMERICAN COS	1- 2	1 7/8	+ 1/R	+7.1
O	COMPU-SERV NETWORK	7- 15	10	+1	+11.1
O	COMP ELECTION SYSTMS	6- 10	9 1/4	+ 1/4	+2.7
O	COMRUTER HORIZONS	1- 4	4	0	0.0
O	COMPUTER NETWORR	6- 12	11 3/8	- 1/4	-2.1
N	COMRUTER SCIENCES	7- 13	10 3/4	-1 3/4	-14.0
O	COMRUTER TASK GROUP	1- 4	3 1/4	0	0.0
O	COMRUTER USAGE	1- 4	2 5/8	- 1/4	-8.6
O	COMSHARE	5- 17	14 1/4	-1 3/4	-10.9
O	OATA OINENSIONS INC	3- 7	6 1/4	- 1/4	-3.8
O	OATATAB	1- 2	1	0	0.0
N	ELECTRONIC DATA SYS.	14- 23	18 3/4	-1 3/4	-8.5
O	INSYTE CORP	2- 3	2 1/8	+ 3/4	+54.5
O	IPS COMPUTER MARRET.	1- 2	2 3/8	0	0.0
O	KEANE ASSOCIATES	3- 6	5 1/2	- 1/2	-8.3
O	KEYDATA CORP	1- 3	2 1/2	+ 1/4	+11.1
A	LOGICOM	7- 17	12 1/4	- 1/2	-3.9
A	MANAGEMENT DATA	1- 2	1 1/8	0	0.0
A	NATIONAL CSS INC	10- 28	24	-4	-14.2
O	NATIONAL DATA CORP	4- 12	10 5/8	- 3/4	-6.5
A	ON LINE SYSTEMS INC	16- 26	22 5/8	-1 3/4	-7.1
N	PLANNING RESEARCH	3- 8	7 3/8	- 5/R	-7.8
O	PROGRAMMING & SYS	1- 1	3/4	0	0.0
O	RARIOATA INC	2- 6	5	- 7/8	-14.8
O	REYNOLDS & REYNOLO	17- 28	25 1/2	-1 3/4	-6.4
O	SCIENTIFIC COMPUTERS	1- 6	5 1/R	- 1/4	-4.6
O	TYMSHARE INC	14- 27	24 1/4	-1 1/2	-5.8
A	URS SYSTEMS	4- 7	6 7/8	+ 1/P	+1.8
N	WYLY CORP	1- 5	3 7/8	- 1/4	-6.0

RERIPHERALS & SUBSYSTEMS

EXCH		PRICE 1977-78 RANGE (1)	CLOSE JUN 21 1978	WEEP NET CHNGE	WEER PCT CHNGE
N	ADDRESSOGRAPH-MULT	10- 25	23 5/8	- 5/8	-2.5
O	ADVANCED MEMORY SYS	7- 14	12 5/8	-1	-7.3
N	AMPEX CORP	8- 17	14 3/8	-1 1/2	-9.4
O	ANDERSON JACOBSON	3- 9	7 1/P	- 5/8	-8.0
N	ARRLIED DIG DATA SYS	10- 20	16	-1 1/2	-8.5
O	BEEHIVE INT'L	4- 12	4 1/4	-2 1/2	-37.0
A	BOLT,BERANEK & NEW	6- 11	9 1/4	- 3/4	-7.5
N	BUNKER-RAND	8- 18	14	-2 1/8	-11.7
A	CALCOMR	3- 9	7 3/8	- 5/8	-7.8
O	CAMBRIDGE MEMORIES	1- 5	5 5/8	-1	-15.0
N	CENTRONICS DATA COMP	16- 30	27 3/8	- 7/8	-3.0
O	COGNITRONICS	1- 4	3	-1 3/8	-31.4
O	COMRUTER COMMUN.	5- 10	9	- 3/8	-4.0
O	COMPUTER CONSOLES	4- 9	8 1/4	- 1/2	-5.7
A	COMPUTER EOUIRMENT	2- 6	4 3/4	- 1/4	-5.0
O	COMPUTER TRANSCEIVER	1- 1	1 5/8	0	0.0
O	COMTEN	9- 20	22 3/4	-4 1/4	-15.7
N	CONRAC CORP	19- 25	21 5/8	-1 3/4	-7.4
O	OATA ACCESS SYSTEMS	4- 5	5 3/4	+ 1/2	+9.5
O	DATA 100	6- 17	15	- 1/4	-1.6
A	OATA RROOUCTS CORR	9- 24	20 3/8	-2 7/8	-12.3
O	OATA TECHNOLOGY	3- 4	4 1/8	+ 1/8	+3.1
O	OATUM INC	1- 4	3 3/4	- 1/4	-6.2
O	OECISION OATA COMPUT	2- 4	3 5/8	- 5/8	-14.7
O	OELTA OATA SYSTEMS	1- 1	5/8	0	0.0
A	OOCUMATION INC.	6- 24	21 1/4	-1	-4.4
O	OATARAM CORR	2- 24	18	-3 3/4	-17.2
N	ELECTRONIC M & M	4- 7	6 1/4	- 5/8	-9.0
O	FABRI-TEK	1- 2	1 5/8	+	+3.8
O	GENERAL COMPUTER SYS	0- 2	1 1/2	- 1/4	-14.2
N	HAZELTINE CORP	8- 16	14 1/4	-1 1/4	-8.0
N	HARRIS CORP	28- 61	54 1/8	-5 1/8	-8.6
O	INFOREX INC	4- 10	8 5/8	-1	-10.3
O	INFORNATION INTL INC	8- 14	9 1/4	0	0.0
O	INTEL CORP	38- 62	57	-3	-5.0
A	LUNDY ELECTRONICS	3- 6	3 1/2	+ 1/2	+16.6
O	MSI OATA CORP	6- 19	16 3/4	-1 1/4	-6.9
N	MEMOREX	23- 49	41 1/8	-4 5/8	-10.1
N	MOHAWK DATA SCI	5- 12	10	-1 1/8	-10.1
O	PERTIL CORR	2- 12	9 3/4	-2 1/2	-20.4
N	PERTEC CORP	7- 14	11	- 7/8	-7.3
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	PRECISION INST.	2- 2	2	0	0.0
O	QUANTOR CORR	2- 5	2 3/8	- 1/2	-17.3
O	RECOGNITION EQUIP	6- 12	11 1/8	-1	-8.2
O	SCAN OATA	1- 4	3 1/8	- 1/8	-3.8
N	STORAGE TECHNOLOGY	10- 46	21 1/4	-25	-54.0
O	7 BAR INC	7- 19	17	- 1/2	-2.8
O	TALLY CORR.	4- 9	7 5/8	- 7/8	-10.2
A	TEC INC	6- 10	9 1/4	- 7/8	-8.6
M	TEKTRONIX INC	29- 45	41 1/2	-2 1/4	-5.1
N	TELEX	2- 7	5 1/4	-1	-16.0
O	TESDATA SYSTEMS CP	13- 20	17	-1 3/4	-9.3
O	WILTEK INC	1- 1	1 1/4	- 1/8	-9.0

SUPPLIES & ACCESSORIES

EXCH		PRICE 1977-78 RANGE (1)	CLOSE JUN 21 1978	WEER NET CHNGE	WEER RC7 CHNGE
A	AMERICAN BUS PROOS	6- 9	8 1/4	- 3/4	-8.3
O	BALTIMORE BUS FORMS	1- 5	4 1/2	0	0.0
A	BARRY WRIGHT	10- 28	22	-4 1/8	-15.7
O	CYBERMATICS INC	1- 1	1 1/8	- 1/8	-10.0
O	DUPLEX PRODUCTS INC	14- 27	25 1/4	- 7/8	-3.3
N	ENNIS BUS. FORMS	6- 17	14 3/8	-1 1/2	-9.4
N	3M COMPANY	43- 57	54 7/8	-1 1/2	-2.6
O	MOORE CORP LTD	24- 37	33 1/4	+ 1/2	+1.5
N	NASHUA CORP	16- 31	26 1/2	-2 1/2	-8.6
O	STANDARD REGISTER	18- 26	21	-1 1/4	-5.6
A	TAB PRODUCTS CO	5- 13	13 1/8	+1 3/4	+15.3
N	UARCO	18- 27	24 3/4	- 1/4	-1.0
A	WABASH MAGNETICS	10- 15	13	- 7/8	-6.5
N	WALLACE BUS FORMS	17- 25	24	- 3/4	-3.0

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